

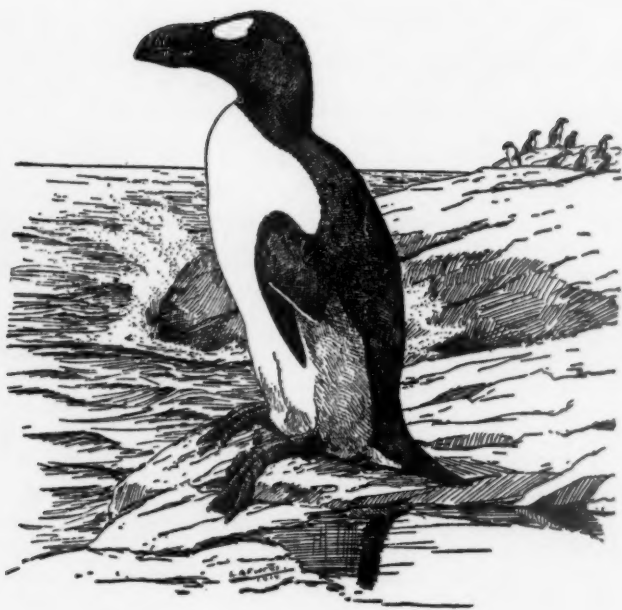
# The Auk

*A Quarterly Journal of Ornithology*

Vol. 69

JULY, 1952

No. 3



PUBLISHED BY

**The American Ornithologists' Union**

## CONTENTS

DISPERSAL, BREEDING BEHAVIOR, AND LONGEVITY OF BANDED BARN OWLS IN NORTH AMERICA. By <i>Paul A. Stewart</i> . . . . .	227
OBSERVATIONS OF DUCK HAWKS NESTING ON MAN-MADE STRUCTURES. By <i>Horace Groskin</i> . . . . .	246
DISTRIBUTIONAL NOTES ON SOME PHILIPPINE BIRDS. By <i>D. S. Raber</i> . . . . .	253
IN MEMORIAM: LYNDY JONES. By <i>S. Charles Kendeigh</i> . . . . .	258
OFFSHORE OBSERVATIONS OF TROPICAL SEA BIRDS IN THE WESTERN PACIFIC. By <i>Keith L. Dixon</i> and <i>William C. Starrett</i> . . . . .	266
CERTAIN MOLTS AND PLUMAGES OF ACADIAN AND YELLOW-BELLIED FLY-CATCHERS. By <i>Robert M. Mengel</i> . . . . .	273
HATCHING OF EGGS OF HAND-REARED WOOD THRUSHES. By <i>H. Roy Iver</i> . . . . .	284
HAZARDOUS NESTING OF THE CHIMNEY SWIFT. By <i>Ralph W. Dexter</i> . . . . .	289
BIRDS FROM POPOCATÉPTL AND IXTACCHUATL, MEXICO. By <i>Raymond A. Paynter, Jr.</i> . . . . .	293
A JOINT NESTING OF CARDINALS AND SONG SPARROWS. By <i>Hervey Brackbill</i> . . . . .	302
TWENTY-SEVENTH SUPPLEMENT TO THE AMERICAN ORNITHOLOGISTS' UNION CHECK-LIST OF NORTH AMERICAN BIRDS . . . . .	308
GENERAL NOTES.—Sex Displays of the Slate-colored Junco, <i>Junco hyemalis</i> ; Nesting of Clay-colored Sparrow, <i>Spizella pallida</i> , in Northern Ontario; Definitions for the Analysis of Survival of Nestlings; Notes on Birds of Jamaica. . . . .	313
NOTES AND NEWS . . . . .	322
RECENT LITERATURE. . . . .	324
OBITUARIES.—William Procter; Charles Theodore Ramsden; Walter E. Rogers; Orpheus Moyer Schantz; Rollin Burdette Trouslot; Arthur Baldwin Williams . . . . .	349

---

Printed by The Intelligencer Printing Company  
Lancaster, Pa.

Entered as second-class mail matter in the Post Office at Lancaster, Pa.,  
May 15, 1920, under the Act of August 24, 1912

Accepted for mailing at special rate of postage provided for in the Act of October 3, 1917, embodied in paragraph (d)-(2) of Section 34.40, P. L. and R., of 1948, authorized May 15, 1920.

# THE AUK

A QUARTERLY JOURNAL OF

ORNITHOLOGY

---

VOL. 69

JULY, 1952

No. 3

---

## DISPERSAL, BREEDING BEHAVIOR, AND LONGEVITY OF BANDED BARN OWLS IN NORTH AMERICA

BY PAUL A. STEWART

### INTRODUCTION

RECOVERIES of banded Barn Owls, *Tyto alba pratincola*, indicate that vast displacement sometimes occurs among certain segments of the population in spite of the fact that the Barn Owl is usually considered a permanent resident species wherever it nests. Banded Barn Owls have traveled from Ohio to Florida, Louisiana, Arkansas, Alabama, Georgia, North Carolina, Virginia, and Ontario; from Pennsylvania to Arkansas and Georgia; from Maryland to New York; from New Jersey to North Carolina and South Carolina; from Illinois to South Dakota and Mississippi; from Massachusetts to Maryland; from Wisconsin to Arkansas; from Nebraska to Texas; and from the northern half of California to its southern tip. This geographic displacement of Barn Owls is frequently mentioned in the literature, but there are only fragmentary references to its implications. There are also neglected facts on breeding behavior and longevity hidden among the banding data. The recovery records of banded Barn Owls are clearly deserving of a more searching analysis than has yet been attempted, and this is the purpose of the present paper.

It is at once apparent that the data pertinent to specific problems cannot be sufficiently extensive in each case to support adequately all deductions to be made, and any hypothesis which is suggested will be offered with the realization that convincing support must await the accumulation of many more data. Certainly, final conclusions are not possible without vastly more data than are available. Conclusions presented in the following pages are necessarily tentative, and some may not stand the test of time.

### ACKNOWLEDGMENTS

I am grateful to Seth H. Low, of the U. S. Fish and Wildlife Service, for placing at my disposal all of the recovery records of Barn Owls

banded in the United States. I am also grateful to Chandler S. Robbins, of the U. S. Fish and Wildlife Service, for giving me access to the manuscript of the forthcoming edition of the American Ornithologists' Union check-list and to the bird distribution files of the U. S. Fish and Wildlife Service. The persons responsible for marking these birds and for reporting their recovery to the Fish and Wildlife Service have performed a service essential to this study, but space does not permit mention of their names.

#### CORRECTION

Seth H. Low has asked me to record a correction pertaining to the place of recovery of Barn Owl, 38-644785, which was erroneously reported by M. T. Cooke (1941:159). This bird was reported to have been taken at Mills Island, Ontario. The correct place of recovery is Girdle Tree, Maryland.

#### DATA AVAILABLE

Because of its large size and close association with human dwellings, and because it has the misfortune to be considered a pest by misinformed persons, the Barn Owl is very productive of returns of banded birds. I have received returns on 27.6 per cent of the 76 birds banded at Leetonia, Ohio, and 14.7 per cent of all Barn Owls banded in the United States have been recovered. No Barn Owls have been banded since 1945 at Leetonia, and it can perhaps be assumed that a high percentage of the total returns is now in for that station. The overall percentage in the United States could be expected to increase through successive years and should reach its peak in approximately 12 years, if no new birds are banded in the meantime.

Up to March 20, 1950, a total of 2298 Barn Owls had been reported banded with U. S. Fish and Wildlife Service (formerly U. S. Biological Survey) bands. Of this total, 336 individuals had yielded 340 returns. The age was not given for nine of these birds; 87 were considered to be adult when banded; and 240 were nestlings. Most of these birds were banded in California (37.5%) and Ohio (20.2%), but some were banded in each of 21 states (Table 1).

It should be pointed out that the ages used in this paper are based on the time between the original banding and the recovery dates. About one month should be added to the ages of those banded as nestlings if the actual ages of the birds are desired.

Birds recovered within 10 miles of their banding localities are arbitrarily assumed to have been taken at the same places they were banded. As a matter of fact, a high degree of exactness in spotting

TABLE 1  
LOCATION OF BANDING OF 336 BARN OWLS WHICH WERE LATER RECOVERED

<i>State</i>	<i>Number nestlings</i>	<i>Number adults</i>	<i>No age given</i>	<i>Total</i>
Alabama	—	1	—	1
California	75	48	3	126
Delaware	4	1	—	5
Florida	1	—	—	1
Illinois	7	5	—	12
Indiana	5	3	—	8
Kansas	3	2	1	6
Maryland	1	3	—	4
Massachusetts	16	1	—	17
Michigan	6	4	2	12
Missouri	—	1	—	1
Nebraska	1	1	—	2
New Jersey	17	3	1	21
New York	10	1	—	11
Ohio	64	4	—	68
Oklahoma	3	4	—	7
Pennsylvania	20	3	—	23
South Dakota	—	1	—	1
Tennessee	5	—	2	7
Texas	1	1	—	2
Wisconsin	1	—	—	1
Total	240	87	9	336

the various localities of recovery is impossible, for it sometimes happens that a bird is reported from the finder's address rather than from the spot where the bird was found. This factor may introduce some error into the data, but it is not believed to affect the conclusions to a significant degree. Likewise, the dates for recovery are not entirely dependable, and there are cases where the birds were found after being dead an indefinite period of time. In a few cases no exact dates are available, and only month or season is given. In such cases the first day of the indicated period is used.

#### DISPERSAL OF BARN OWLS FROM HATCHING PLACES

Two hundred and forty Barn Owls, banded as nestlings, were later recovered. The places of recovery of four could not be located. Of the remaining 236, there were 155 birds (65.7%) taken within 50 miles of their hatching places and 81 (34.3%) at points 51 or more miles distant (Fig. 1). Many of these birds which failed to travel were killed near their hatching places before they had opportunity to travel. Some displacement of young occurs soon after they are out of the nest, but it reaches its peak when the young are eight months of age (Table

2). It can certainly be assumed that a Barn Owl killed near its hatching place before it is six months of age has not had full opportunity to travel. After eliminating the 64 birds which were taken near their hatching places before they were six months of age, there were still 52.9 per cent of the young owls recovered within 50 miles of their hatching places. In the absence of evidence to the contrary, it

TABLE 2  
AGE OF BARN OWLS RECOVERED DURING THEIR FIRST YEAR MORE THAN FIFTY  
MILES FROM THEIR HATCHING PLACE

Age in months	Number of birds	Age in months	Number of birds
1	3	7	5
2	4	8	10
3	6	9	2
4	7	10	2
5	8	11	4
6	3	12	0

must be assumed that all birds recovered near their hatching places have been continuously present there. This is by no means certain, but it is reasonably certain that some birds remain to nest in the general locality of their hatching places. The remaining 47.1 per cent were recovered at a distance of more than 50 miles from their places of nativity.

There is a striking difference between the degrees of displacement occurring among birds banded in the northern and in the southern parts of the present range of the Barn Owl. If 35° N is chosen as a line to divide northern and southern birds, all southern birds are relatively sedentary (Table 3). No southern birds have been recovered more than 90 miles from their hatching places and only eight, or about 11.9 per cent, of the 67 recoveries were of birds which traveled as much as 50 miles. Of the 119 northern birds which lived to be six months of age or traveled before six months—38.7 per cent were taken within 50 miles of their hatching places, and 61.3 per cent were taken at distances of more than 50 miles; 56.3 per cent were recovered within 100 miles of their hatching places, and 43.7 per cent were recovered more than 100 miles distant; 72.3 per cent were taken within 200 miles, and 27.7 per cent more than 200 miles from the places of nativity.

Unfortunately, there are few recovery records for Barn Owls banded in the southern part of the eastern United States and the northern part of the western United States; this makes it uncertain whether the difference in the dispersal pattern is between north and south or east and west. Of 13 recovery records of birds banded north of the



TABLE 3  
DISTANCE OF RECOVERY FROM HATCHING PLACES OF BARN OWLS

Miles traveled	Number birds		Miles traveled	Number birds	
	northern	southern		northern	southern
0-50	96	59	501-600	5	—
51-100	21	8	601-700	4	—
101-200	19	—	701-800	1	—
201-300	9	—	801-900	3	—
301-400	7	—	901-1000	—	—
401-500	3	—	1001-1100	1	—
TOTAL				169	67

the few records from southeastern and south-central United States, a sedentary pattern of behavior is suggested for all Barn Owls native to the area south of 35° N.

All significant displacement of Barn Owls involves northern birds. The majority of the northern birds which traveled more than 50 miles from their hatching places went in a general southward direction, but movement was by no means confined to that direction. Of the 54 birds which traveled more than 50 miles during their first year, 63.0 per cent went in a southerly direction. Of the remaining 37.0 per cent, some of the birds traveled in each of the other main compass directions. In Europe, Schneider (1937:161) also reported the dispersal of young Barn Owls, *Tyto alba guttata*, in all directions from their hatching places. Progressing northward from 35° N, our banded birds show a diminishing tendency for dispersal to be restricted to a southward direction (Fig. 2). At the northern periphery of the range of the Barn Owl, which is considered to include northern Ohio, there is little concentration of southward flying birds. This habit of northward dispersal may have been a very effective mechanism for extending the range of the Barn Owl. The literature gives abundant evidence of the fact that the range of the Barn Owl has been extended northward in comparatively recent years.

Wheaton (1879:406) reported that the first positive Ohio record was made about 1861. Dawson (1903:372) considered the Barn Owl common in the Scioto River Valley, but it was accorded that status nowhere else in Ohio. However, its occurrence had been recorded at various points in Ohio, and it had reached the southern shore of Lake Erie. The Barn Owl now breeds north to southern British Columbia, North Dakota, southern Michigan, southern Ontario, and Massachusetts. It ranges north casually to southern Saskatchewan, southern Manitoba, eastern Ontario, northern Vermont, and southern Maine (from manuscript of forthcoming edition of A.O.U. check-list).

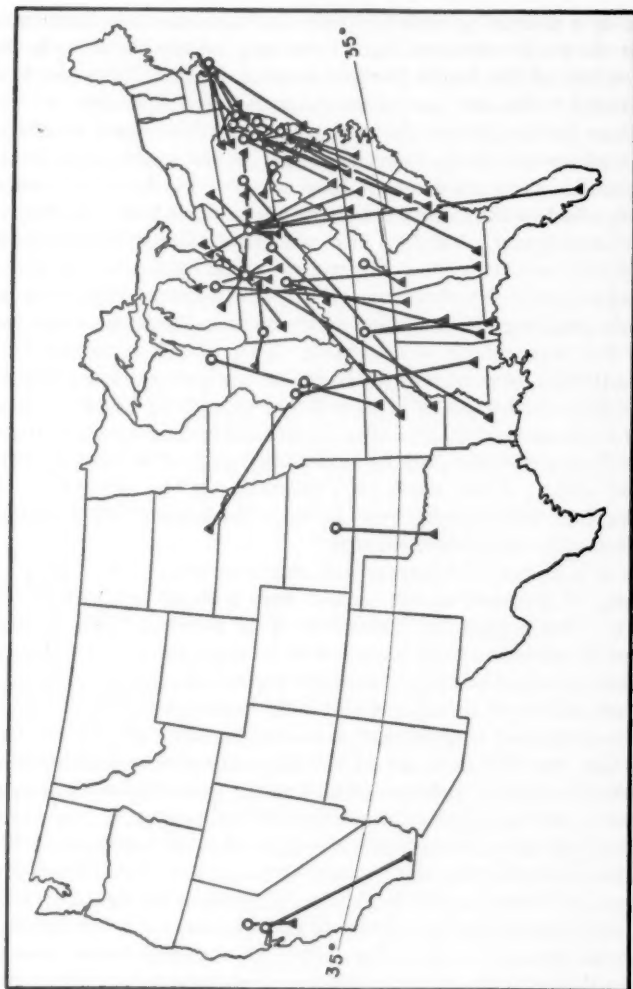


FIGURE 2.—Geographic Displacement of Barn Owls Banded as Nestlings and Recovered 100 Miles or More from Their Hatching Places. Places of banding are indicated by circles, and places of recovery are indicated by triangles.

There is a distinct probability that the non-sedentary pattern of behavior shown by northern Barn Owls may be associated with the newer portion of the bird's North American range. However, it is not restricted to the new part of the range as it is now known.

The Barn Owl is a bird of the open country, rather than a woodland species, and removal of the forest doubtless played a part in its northward spread. Temperature and food supply also have a marked inhibitory effect on the northward distribution of this bird. Errington (1931:60) and Speirs (1940:571) have published records of Barn Owls which died in the north, either because of intense cold or lack of accessible food or both. The birds reported by Errington and Speirs failed to migrate southward but remained in the north in the midst of adverse weather they were unable to withstand. This, as well as the fact that much southward movement of the Barn Owl occurs in the late summer, suggests that southward movement is not related to adverse winter weather or to food shortages. On the other hand, an unusual abundance of food sometimes induces high concentrations of these birds in restricted areas. From southern California, Gallup (1949:150) reported having "seen as many as 30 birds on the beach at night feeding on grunion when these were running."

There is a marked displacement of northern Barn Owls during an early stage of life, and at this period there is flight in all directions (Table 4). Some birds, in addition to those listed in Table 4, were recovered in subsequent years more than 50 miles from their hatching places, but it cannot be known when the flights were made. The high percentage recovered at notable distances from their hatching places during the first year suggests that there may be more dispersal at this stage of life, but this may not be a valid conclusion as other factors are involved. Such a conspicuous bird as the Barn Owl must be relatively more susceptible to capture when it first arrives in a new area than after it has had opportunity to adjust to local conditions. The annual yield of returns is also reduced in successive years by the fact that there are fewer banded birds alive to produce returns.

Fall migration of the Barn Owl is not a new idea, for it is implied in the early literature. A. K. Fisher (1893:133) stated "it migrates more or less in the northern part of its range, and there is an appreciable increase in the number of individuals to the southward during the fall months."

Stone (1937:624) reported: "The Barn Owl is a regular autumn transient in the pine woods at Cape May Point [New Jersey] occurring most frequently during October; some remain through the winter and a few doubtless nest in the vicinity. Usually we see only a single bird

but, as they are very secretive during the day, others may often be present that we do not discover. Our dates of occurrence run from October 11 to November 11 during the years 1923 to 1931. These were merely the result of scattered trips covering only single days, but in 1925, William Rusling, who was present throughout the autumn until early November watching the hawk flight, counted twenty-six Barn Owls, some of which of course may have been duplications and on some occasions he saw as many as five or six in the course of a day, which probably gives a fair idea of their maximum abundance. He saw none until September 16 and his last record was November 3. He tells me that they roosted quietly in the pine groves during the day and flew over the houses at night uttering their harsh whistling gasp *eeeeee séeek.*"

TABLE 4  
DIRECTION OF MOVEMENT OF BARN OWLS WHICH TRAVELED MORE  
THAN 50 MILES DURING THEIR FIRST YEAR

<i>Direction of flight</i>	<i>Number birds</i>	<i>Direction of flight</i>	<i>Number birds</i>
North	3	South	11
North-Northeast	3	South-Southwest	9
Northeast	2	Southwest	9
East-Northeast	1	West-Southwest	1
East	3	West	3
East-Southeast	2	West-Northwest	2
Southeast	1	Northwest	2
South-Southeast	1	North-Northwest	1

Banding records show that Barn Owls have made many notable flights of over 500 miles southward during the fall. The longest of these was 1075 miles or from Leetonia, Ohio, to Naples, Florida. This flight was made by a bird banded on May 22, 1933, and "probably killed" on January 30, 1934. The pattern of movement is shown on an accompanying map (Fig. 2) for all young Barn Owls which were recovered more than 100 miles from their hatching places.

Birds in their first year have been taken more than 50 miles in a general southward direction from their hatching places during every month except July and August (Table 5). It is significant that when the minimum distance is increased to 100 miles the southern returns for the summer months decrease, and when the minimum distance is further increased to 200 miles the southern returns are eliminated from June through August. No banded birds have ever been taken more than 200 miles south of their hatching places during the summer months, and 27 have been recovered more than 200 miles south from their places of nativity at other seasons. The possibility that these birds return north in the spring is strongly indicated.

Stone (1937:626) hinted at a possible spring migration: "I have no spring Barn Owl records . . . that would indicate a northward migration but Julian Potter heard one flying overhead and uttering its characteristic screech on March 21, 1926, at Collingswood, Camden County [New Jersey], and at about the same time John Gillespie flushed one from near the ground at Glenolden, Pa., which evidently had no permanent retreat so that it appeared as if a migration might be under way."

TABLE 5

MONTHS DURING WHICH YOUNG BARN OWLS WERE RECOVERED DURING THEIR FIRST YEAR AND MORE THAN 50 MILES IN A SOUTHWARD DIRECTION FROM THEIR HATCHING PLACES

Month	51-100 Miles	101-200 Miles	201 or more miles
January	5	5	4
February	8	8	5
March	2	2	2
April	2	1	1
May	2	2	1
June	3	2	—
September	2	1	1
October	2	2	2
November	8	6	6
December	6	5	5

This is the only published evidence which I am able to find for northward migration of the Barn Owl. In addition to the evidence furnished by birds banded as nestlings, the adults give similar support to the proposition of northward migration. This will be further considered in a subsequent section, and it suffices to say here that young are believed to return northward to nest somewhere within 200 miles of their hatching places. With the single exception of the Illinois bird which was recovered in South Dakota, this conclusion is valid for all of the birds which were taken during the summer months.

In Europe, Schneider (1937:161) has suggested that young Barn Owls, *Tyto alba guttata*, settle down to nest after dispersal has taken place, and that there is no hint of a return flight. Two of his birds, which had been banded as nestlings, were later recovered on their breeding grounds 60 and 75 miles north and southwest, respectively, from their hatching places. Schneider reported no evidence for breeding of Barn Owls recovered at greater distances from their hatching places. Both the hatching places and the breeding places are definitely established for two American Barn Owls. One of these was a female which was banded at Horsham, Pennsylvania, and nested 60 miles east at Staten Island, New York. The second was

banded as a nestling at Chilmark, Massachusetts, and was found nesting 140 miles southwest, at Hunts Point, New York, the second and third years following the banding date. This also was a female, and it was known to remain at the New York location for three broods of young during two successive years.

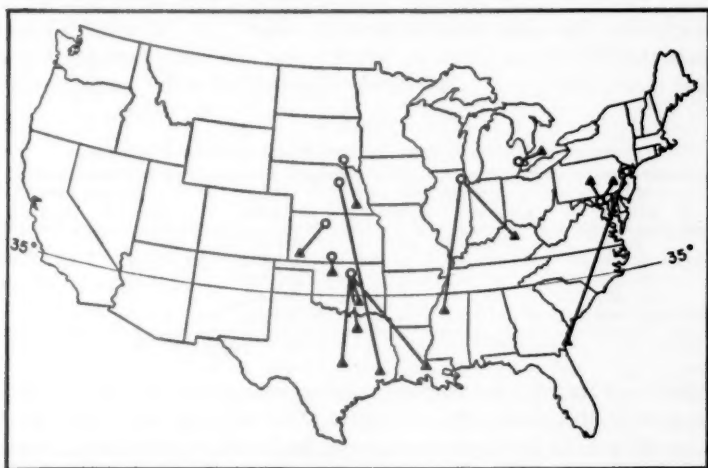


FIGURE 3.—Geographic Displacement of Barn Owls Banded as Adults and Recovered 100 Miles or More from Their Banding Places. Places of banding are indicated by circles, and places of recovery are indicated by triangles.

#### GEOGRAPHIC DISPLACEMENT OF ADULTS

A total of 87 Barn Owls, considered to be adults when banded, were later recovered. The recovery places of four could not be located. Of the remaining 83, there were 64 birds (77.1%) taken within 50 miles of the places of banding and 19 (22.9%) which had traveled more than 50 miles. Of those which were taken within 50 miles of the places of banding, 20 had been killed within two months from the time of banding and scarcely had an opportunity to travel. Of the 14 which had traveled more than 100 miles, 78.6 per cent were taken in a general southward direction from the banding places (Fig. 3).

When the northern banded adults are segregated (Table 6), the case for displacement of adults becomes far more impressive. Of the 33 northern adults which were known to be alive 10 days after banding, 51.5 per cent traveled more than 50 miles from the banding place. It would seem that northern adults travel about the same extent as

do young birds. However, additional recoveries of northern adults are desirable to support adequately this conclusion.

An important weakness in this conclusion involves the difficulty in making accurate identification of the age of Barn Owls during their first six months out of the nest. According to Bent (1938:144), ". . . the first winter plumage is acquired at a very early age and is nearly complete when the bird leaves the nest . . . Most authorities state the first winter plumage, which is the first real plumage, is like that of the adult . . ." It is conceivable that all of the banded adults

TABLE 6  
DISTANCE OF RECOVERY FROM BANDING PLACE OF ADULT BARN OWLS

Miles traveled	Number birds		Miles traveled	Number birds	
	northern	southern		northern	southern
0-50	22	43	401-500	1	—
51-100	3	2	501-600	1	—
101-200	6	—	601-700	0	—
201-300	3	—	701-800	1	—
301-400	1	—	801-900	1	—
TOTAL				39	45

which later traveled were actually young birds in their first six months. In view of this possibility, Schneider (1937:167) assumed that all of his adult banded European Barn Owls which later traveled a significant distance from their banding localities were actually young birds. Our data definitely forestall a similar procedure, as the percentage of adults (22.9%) to travel more than 50 miles from the places of banding is not sufficiently lower than the percentage of nestlings (34.3%) to do the same. It must be borne in mind that non-selective banding during the critical period would also include the sedentary segment of the young bird population. Consequently, it would be necessary that almost all of the birds banded as adults should actually be young birds only recently out of the nest.

As with birds banded as nestlings, no adult Barn Owls have been taken during the summer months more than 200 miles in any southerly direction from the locality of banding (Table 7). Therefore, seven nestlings banded in the north and recovered more than 200 miles southward sometime after their first year must have gone south as adults. It seems practically certain that adult birds migrate to nearly the same extent as do young birds.

Three birds banded as adults give some definite clue as to the time and speed of southward migration. The records of these birds are given in an accompanying table (Table 8). These birds were obviously in movement at the time of banding or started promptly afterward.

TABLE 7

MONTHS OF CAPTURE, MORE THAN 50 MILES SOUTHWARD FROM BANDING LOCALITY, OF BIRDS Banded AS ADULTS OR NESTLINGS AND RECOVERED MORE THAN A YEAR LATER

Month	51-100 miles	101-200 miles	201 or more miles
January	3	2	2
February	4	4	3
March	2	2	1
April	3	2	1
May	3	—	—
June	1	1	—
July	4	4	—
September	1	—	—
October	3	3	2
November	6	6	4
December	3	3	2

The average speed of movement was 17.5 miles per day for the three birds, and the maximum speed shown by a single bird was 26.1 miles per day for 23 days.

The banding data give evidence of northward as well as southward movement of northern Barn Owls. Likewise, there is good indication of the general period in which these movements occur. All Barn Owls have returned northward to within 200 miles of their hatching places by the first of April. There seems to be some continued northward movement within the 200-mile zone through April, and the last of the northward movement may not be complete until mid-April

TABLE 8

SELECTED SAMPLES SHOWING SOUTHWARD MIGRATION OF ADULT BARN OWLS

Band number	Banding place	Banding date	Recovery place	Recovery date	Miles traveled	Days elapsed	Average miles per day
36-607607	Stockton, Kan.	Sept. 30, 1936	Elkhart, Kan.	Oct. 15, 1936	225	15	15
36-715920	Blue Island, Ill.	Nov. 27, 1938	Shaw, Miss.	Dec. 20, 1938	600	23	26.1
39-671810	Stillwater Okla.	Dec. 9, 1939	Van Ales-tyne, Tex	Jan. 1, 1939	225	22	10.2

or early May (Table 7). The southward movement may be made rather rapidly by individual birds, but the period of fall movement for the species probably covers the period through August to December or January.

There is a single record of a bird which was evidently enroute northward when it was banded. This bird was banded at Laurel, Maryland, on April 8, 1947, and recovered 125 miles north-northwest

at Bellefonte, Pennsylvania, on May 14 of the same year. The dates strongly suggest spring migration. The possibility exists, of course, that this may have been a case of post-natal wandering by a young bird only recently out of the nest.

#### BREEDING BEHAVIOR OF BANDED BARN OWLS

Wallace (1948:16) noted that "There are cases of downy young for every month of the year," and the literature contains other references to the lack of confinement of breeding activities of Barn Owls to any

TABLE 9  
MONTHS IN WHICH NESTLING BARN OWLS WERE BANDED

Month	Number of Birds Banded		Total
	southern	northern	
January	1	1	2
February	—	—	—
March	3	1	4
April	38	2	40
May	13	32	45
June	14	71	85
July	—	29	29
August	—	5	5
September	—	8	8
October	—	8	8
November	—	7	7
December	—	3	3

given season. Likewise, the records for banding of nestlings are distributed through every month of the year except February (Table 9). However, there are relatively more nestlings banded during the period, April to July. Allowing three weeks for incubation and one month for the birds to reach the age for banding, maximum egg laying probably occurs during March, April, May, and June. Within this period there is a marked peak in June for the banding of nestling owls. The peak of egg laying which produced these birds must occur in April or early May.

In view of the possibility that banders may have been more active during the period of April through July, several of the more active Barn Owl banders were questioned on this point. In each case they reported having checked their nesting sites at different periods during the year. In my own case, two Barn Owl nesting sites were regularly checked in connection with annual Christmas bird counts. Irregular checks were also made through the summer months in connection with a Barn Swallow banding program.

Again it proves desirable to segregate those Barn Owls which were banded in the southern United States (Table 9) since a different pattern of breeding behavior is shown there. A well-defined breeding season is indicated, and all except one of the southern young were banded during March, April, May, and June, with the maximum number being banded during April. The single southern bird banded in January as a nestling was banded in Texas, and the possibility is suggested that southern birds to the eastward do not share the pattern of California birds in restricting nesting activities to the spring months.

Bendire (1895:180) reported two instances of winter nesting of Barn Owls at Washington, D. C.; Williams (1902:198) recorded a December nesting in Florida; and Wayne (1908:21) noted a November nesting in South Carolina. Other records of winter nesting are reported by Goetz (1932:221) for Ohio, by Poole (1930:84) for Pennsylvania and by W. I. Fisher (1947:472) for Illinois. It seems fairly certain that southern California is the only locality in the United States where the breeding of Barn Owls is uniformly confined to the spring months. Gallup (pers. corresp., 1950) pointed out that the nesting period in southern California is closely associated with the rainy season.

Nestling northern Barn Owls have been banded during every month except February, but the species does show a well-defined spring nesting period which is indicated in our data by the banding of larger numbers of nestling birds during May, June, and July. Within this period, a higher peak is shown during the month of June. The banding records suggest that there is a less definite nesting period during September, October, and November. It should be kept in mind that all of these dates must be adjusted backward six to seven weeks, if the comparable egg-laying period is to be determined.

In discussing the second nesting of Barn Owls, Wallace (1948:20) stated that ". . . they often appear to raise a second brood, though what appears to be a second brood could conceivably be merely a reoccupation of a favored nesting site by a new pair after it has been vacated by the first." We have at least one banding record in which this possibility is precluded. This was a female taken from a nest with five young at Hunts Point, New York, on July 27, 1939, and captured four months and eight days later (December 5, 1939) from a nest with three young at the same place.

There is the possibility that continuous nesting of Barn Owls may be associated with the population of prey species. Guerin (1928) in France and Schneider (1937:161) in Germany showed that there is a close relationship between the mouse population and the nesting ac-

tivities of European Barn Owls. Wallace (1948:17) stated: "An alternative explanation, rapidly gaining favor with further study of population cycles, is that the owls may breed more or less continuously during the periods of abundant *Microtus* prey (for about 2 years), and then slow down or cease nesting during periods of rodent scarcity (roughly, for another 2 years)." There needs to be more investigation along this line in the United States.

The Barn Owl is supplied with several attributes, each of which contributes to a high biotic potential. In addition to its ability to raise 2 broods of young per year, which is an unusual feat for a predator, it commonly lays a large clutch, from 5 to 11 eggs. Furthermore, it may be able to breed at a very early age, for a nesting female was captured only 10 months and 9 days after it had been banded as a nestling. Schneider (1937:166) reported two cases of European Barn Owls nesting at a comparable age. These were found nesting 9.0 and 9.5 months, respectively, after being banded as nestlings.

#### LONGEVITY

Banding is potentially a perfect method for obtaining information on the life span of wild birds. Actually, the method contains minor flaws which forestall absolute perfection. Birds are sometimes found after having been dead for an indefinite period of time; then the dates recorded are not the dates of actual death. Also, the finder of the bird has sometimes given only the month or season, and in such cases the first day of the indicated period has been used. All birds have been considered dead at the time of capture unless their release is definitely recorded. In the final analysis, it is believed that factors on one side very nearly counterbalance the effect of opposing factors. At any rate, the average ages given are based on the known ages at the time of recovery, except in the instances of those birds which were definitely known to have been released and those which were known to have been dead a relatively long time before they were found. These few are eliminated from the average.

The average age of 220 Barn Owls banded as nestlings and later recovered dead is 1 year, 5 months, and 25 days. Of these, 5.4 per cent were recovered within the first month after banding, and 65.2 per cent were recovered within the first year (Table 10). The oldest bird reported by Schneider (1937:169) was between eight and nine years of age. In the United States, the oldest banded Barn Owl lived to be at least 11 years, 6 months, and 4 days of age. It was banded as a nestling at Escondido, California, on April 24, 1935, and was captured

near by on October 28, 1946. This bird was kept alive by the finder until it died, which evidently was rather soon.

There is an impressive difference between the average life span of northern and of southern birds. Seventy southern birds had an average life span of 2 years, 2 months, and 26 days; and 150 northern birds had an average life span of 1 year, 1 month, and 4 days. The

TABLE 10  
LONGEVITY OF BARN OWLS

<i>Life span in years</i>	<i>Percent of birds recovered</i>
0-1	65.2
1-2	15.0
2-3	7.3
3-4	3.4
4-5	3.0
5-6	0.8
6-7	0.4
7-8	2.1
8-9	1.2
9-10	0.4
10-11	0.4
11-12	0.4

cause for this marked difference is not clearly indicated by the banding data. Adverse winter weather is known to be a factor in the mortality of Barn Owls in the northern part of their range, as frozen or starved birds are sometimes found. Analysis of the records of 71 northern Barn Owls and 56 southern birds which were reported "found dead" does not disclose significant clustering in the winter months for the northern birds. Also there is no significant difference in seasonal distribution for the records of birds found dead in the two areas.

The above results may indicate too few data. It is probable, too, that the banding records contain many inaccuracies in the item pertaining to the method of capture. Persons may sometimes be uncertain about the legal status of the Barn Owl, and in such cases the most logical thing is to report as found dead a bird which was shot. Because of the inability to make any significant deductions from this item, that part of the record involving the method of capture has been, for the most part, omitted from this analysis.

#### SUMMARY

1. Before March 20, 1950, a total of 2298 Barn Owls had been banded in the United States; 14.7 per cent had been recovered.
2. Two hundred and forty Barn Owls banded as nestlings were later recovered. Of the 236 birds for which the places of recovery were

determined, 65.7 per cent were taken within 50 miles of the hatching places, and 34.3 per cent were taken more than 50 miles distant. The longest distance traveled by any of these birds banded as nestlings was 1075 miles.

3. Eighty-seven Barn Owls banded as adults were later recovered. Of the 83 birds for which the places of recovery were determined, 77.1 per cent were taken within 50 miles of their banding places and 22.9 per cent had traveled more than 50 miles. The longest distance traveled by any of the birds banded as adults was 850 miles.

4. Dispersal of part of the northern banded Barn Owl population took place in all directions during the first year out of the nest, but 63 per cent of the 54 birds that moved went in a southerly direction.

5. Of the 14 adults which traveled more than 100 miles from the place of banding, 78.6 per cent went in a southerly direction.

6. Banded Barn Owls native to the northern part of their North American range were partly migratory; those native to the southern part were relatively sedentary.

7. The absence of northern banded Barn Owls in the south during the summer suggests a return to the north for that season.

8. A study of the banding records suggests that southward migration occurs chiefly through the period August to December, and that northward migration occurs during March and April.

9. An average southward migration speed of 17.5 miles per day was shown by three birds. One averaged 26.1 miles per day for 13 days.

10. The banding data and published records indicate that northern and eastern Barn Owls breed during every month of the year, but chiefly during May, June, and July with the peak occurring in June. Barn Owls in southern California breed only during March, April, May, and June, with the peak occurring in April. All of the months given represent the time of banding and should be adjusted backward about six or seven weeks, if the dates of egg laying are desired.

11. Banding data indicate that Barn Owls nest somewhere within 200 miles in any direction from their hatching places.

12. Barn Owls sometimes rear two broods of young per year.

13. One Barn Owl in the United States has been known to nest ten months and nine days after being banded as a nestling.

14. The average life-span of 220 Barn Owls banded as nestlings is 1 year, 5 months, and 25 days. Of these, 1 bird lived to be at least 11 years, 6 months, and 4 days of age.

15. The average life span of 70 southern Barn Owls is 2 years, 2 months, and 26 days; the average life span of 150 northern birds is 1 year, 1 month, and 4 days.

LITERATURE CITED

- BENDIRE, C. E. 1895. The American Barn Owl breeding at Washington, D. C. in winter. *Auk*, 12: 180-181.
- BENT, A. C. 1938. Life histories of North American birds of prey. Part II. U. S. Natl. Mus. Bull. 170: 1-482.
- COOKE, M. T. 1941. Returns of banded birds: Recoveries of some banded birds of prey. *Bird-Banding*, 12: 150-160.
- DAWSON, W. L. 1903. The birds of Ohio. Part II. (Wheaton Publ. Co., Columbus, Ohio), pp. 1-671.
- ERRINGTON, P. L. 1931. Winter-killing of Barn Owls in Wisconsin. *Wilson Bull.*, 43: 60.
- FISHER, A. K. 1893. The hawks and owls of the United States in relation to agriculture. U. S. Dept. Agr., Div. Ornith. and Mamm., Bull. 3: 1-210.
- FISHER, W. I. 1947. Barn Owl breeding near Chicago, Illinois. *Auk*, 64: 472.
- GALLUP, F. N. 1949. Banding recoveries of *Tyto alba*. *Bird-Banding*, 20: 150.
- GORTZ, C. J. 1932. Late nesting of the Barn Owl. *Auk*, 49: 221.
- GUERIN, G. 1928. La Vie des Chouettes. Regime et Croissance de l'Effraye Commune *Tyto alba alba* (L.) en Vendee. (P. Lechevalier, Paris), pp. 1-157.
- POOLE, E. L. 1930. Winter nesting of the Barn Owl. *Auk*, 47: 84.
- SCHNEIDER, W. 1937. Beringungs-Ergebnisse an der Mitteleuropaeischen Schleiereule (*Tyto alba guttata* Brehm). *Vogelzug*, 8: 159-170.
- SPEIRS, J. M. 1940. Mortality of Barn Owls at Champaign, Illinois. *Auk*, 57: 571.
- STONE, W. 1937. Bird studies at Old Cape May. (Del. Valley Ornith. Club, Phila.), Vol. 2: 521-941.
- WALLACE, G. J. 1948. The Barn Owl in Michigan. (Mich. State Coll., E. Lansing), pp. 1-61.
- WAYNE, A. T. 1908. The breeding season of the American Barn Owl (*Strix pratincola*) in South Carolina. *Auk*, 25: 21-25.
- WHEATON, J. M. 1879. Report on the birds of Ohio. Rept. Geol. Surv. Ohio, 4: 189-628.
- WILLIAMS, R. W., JR. 1902. Unusual nesting date of the Barn Owl. *Auk*, 19: 198-199.

*Department of Zoology and Entomology, Ohio State University,  
Columbus 10, Ohio, January 3, 1952.*

OBSERVATIONS OF DUCK HAWKS NESTING ON  
MAN-MADE STRUCTURES

BY HORACE GROSKIN

THE Duck Hawk, *Falco peregrinus anatum*, usually nests on high cliffs in wild country, but it has also been known to nest on small, low cliffs only 75 feet above ground. It is rather a rare occurrence for Duck Hawks to nest on man-made structures, and so far as I am aware, there are only six records up to 1949 of Duck Hawks nesting successfully on man-made structures in North America east of the Rocky Mountains. One pair was reported to have made an attempt to nest on a skyscraper in New York City for over two years, courting and copulating in season, but no eggs were laid (Herbert, Kassoy, *in litt.*). One pair of Duck Hawks in 1939 nested successfully on an abandoned stone-bridge pier which was isolated in an adjacent river (F. and J. Craighead, 'Hawks in the Hand,' Boston, 1939). A second pair of Duck Hawks nested successfully in 1940 and raised young, under management, on a skyscraper in Montreal, Quebec, Canada (J. D. Cleghorn, C. E. Hall, and E. W. Pfeiffer *in litt.*). A third pair nested and raised young successfully in May, 1943, on top of a hotel building in New York City. The young Duck Hawks were later destroyed. A fourth pair of Duck Hawks nested successfully in a steeple of a church in Harrisburg, Pennsylvania. A fifth pair nested and raised young successfully in 1946 on the city hall tower of Philadelphia, Pennsylvania (Groskin, Auk, 64: 312-314, 1947). A sixth pair of Duck Hawks nested successfully in 1949 on a man-made structure in Philadelphia. The male of this last pair of Duck Hawks may have been the same bird that nested on the city hall tower in 1946, but the female was probably a new mate as was evidenced by the fact that the plumage on her upperparts was dark brown on the mantle instead of gray, indicating she was a comparatively young bird. (All Philadelphia skyscrapers and city hall buildings, including city hall tower, referred to in this paper are located in the business center of Philadelphia.)

In 1946 the Duck Hawks nested on a ledge 361 feet up on the city hall tower, whereas in 1949 they selected a nesting ledge only 100 feet above the street pavement, on one of the low buildings of the city hall. This nesting ledge is 12 feet long and 3 feet wide, faces south, and connects at right angles with another ledge of about the same size facing east.

The scrape was in the corner, against the wall of the building, and where there was some debris which had been deposited by the winds

(Plate 3, *Top*). The location of the scrape protected the eggs, and later the fledgling, from the cold north and west winds. Hickey (Auk, 59: 176-204, 1942) states, "The Peregrine appears to possess an absolute requirement in that the eggs must be laid in a hollow which is scraped out of dirt, gravel, or similar material." The scrape on the ledge of the city hall building did not quite meet these requirements, as the scrape was on a ledge of hard smooth concrete, but the debris in the corner of the ledge appeared sufficient to prevent the eggs from rolling off the ledge.

Observations of the activities on the nesting ledge were not difficult. There was a clear view of the nesting ledge from my office windows on the sixth floor of the Land Title Building, about 380 feet south of the nesting ledge. Another opportunity for observation of the activities on the nesting ledge was available from the ninth floor window of the Lincoln-Liberty Building, which was located about 100 feet across the street from the nesting ledge and about 60 feet above it. Observations were made with 8 by 30 Zeiss and 8 by 50 Hensoldt binoculars.

On May 6, 1949, Edward J. Reimann, who was interested in the nesting of Duck Hawks, was the first one to inform me of the exact location of the nesting ledge. I then called Mr. Max Lieberman who has an office on the ninth floor of the Lincoln-Liberty Building. Mr. Lieberman informed me he had been observing the nesting ledge from his window for some time and gave me the details of what he had observed.

On March 21, 1949, he observed three Duck Hawk eggs on the nesting ledge. Thirty days later, on April 19, he noted that two of the three eggs had hatched; two days later, April 21, one of the fledglings had died and one egg still remained unhatched. According to Hickey (*in litt.*) about one egg in every set fails to hatch.

My first observation was made on May 6, when the fledgling was 18 days old and in pale grayish-white downy plumage. The fledgling was somewhat active, moving a few inches from time to time and stretching its wings. The infertile egg was still on the nesting ledge immediately in front of the fledgling. The tercel (male) flew in and perched on the edge of the ledge and then moved in close to the fledgling but brought no food.

My observations were continuous from May 6 to May 29 when the hawklet left the ledge, and then the observations were continued from time to time until August 10, while the parents and the hawklet were in the air or perching on top of skyscrapers in the immediate vicinity.

*May 9*—Fledgling 21 days old. At 10:50 a. m. was being fed by the falcon (female) and continued feeding until 11:15. A few minutes later the fledgling attempted to stand on its feet, but it tumbled forward on its head. It tried to stand on its feet several times but fell over each time and finally gave up and squatted in the corner of the ledge. Four days later, May 13, after being fed by the female, the youngster hopped out to the very edge of the ledge, squatted, and remained there for about 30 minutes, apparently watching the heavy street traffic below the ledge. During the entire time the youngster squatted on the edge of the nesting ledge, the female remained on the ledge very close to the youngster as if guarding it.

*May 16*—Young 28 days old. During the morning observation the female was covering the youngster with her wings widely spread, protecting it from the sun. On this nesting ledge there was danger of the young being molested. The safety of the Duck Hawk, when nesting, usually requires an eyrie on high cliffs in wild country, but when the hawks nest on a low ledge of a man-made structure in the center of a large city the danger to the adults and young is greatly increased. For example, during this afternoon, while the young bird squatted in the corner of the ledge, two men suddenly appeared on top of the roof directly above the nesting ledge. One of the men carried an iron rod which he lowered from the roof to the youngster apparently intending to kill it, but fortunately the rod was not long enough to reach the bird. The man then secured a longer iron rod and when he lowered it, it was also not long enough to reach the bird. I called to the men and motioned to them to get off the roof. My calling to them made them realize they were being watched so they immediately left the roof. Later, through the officer in charge of the public buildings, arrangements were made to keep all persons off the roof.

*May 18*—Observation 2:30 to 3:10 p. m. Both parents came to the nesting ledge. The male passed food (a Starling) to the female and she fed the young bird. The young now has an increasing number of dark feathers on the under and upper surfaces of the wings, on the scapulars and around the eyes. There is a dark patch on the crown. The tail is dark brown and about two inches long with a buffy terminal band.

*May 19*—At 3 the male brought food and passed it to the female on the ledge. The female dropped the food in front of the youngster which picked it up in its mandibles, carried it around several minutes as if it did not know what to do with it, and finally dropped it. Then the female picked it up with her talons, and with her mandibles tore off several pieces and fed the youngster. At this time both parents

were in almost constant attendance, either on the ledge or close by on one of the buildings.

*May 20*—The young bird now has many more dark feathers on the upperparts, and the tail appears to have grown another inch. At 12:20, in Philadelphia, we had one of the heaviest rain and thunderstorms of this season, lasting several hours. During the worst part of the storm the young was standing in the center of the nesting ledge in the pouring rain for 30 minutes. During this time the young bird was continuously raising its wings, as if to ward off the heavy rain coming down on it. At times it was raining so hard I was afraid that at any moment the bird would be washed off the ledge. To make matters worse, the temperature dropped 19 degrees, from 70° to 51° F. in about two hours. The rainfall was one and one-half inches in one-half hour, and there was a strong northeast wind. At 3:10 it was still raining hard; the female came to the ledge and remained until 3:45 apparently guarding the youngster. We also had very heavy rainstorms on the two following nights. It seemed almost impossible that a young bird only 32 days old would be able to withstand such a terrific attack by the elements.

*May 23*—Young 35 days old. Today a considerable change in color of the plumage of the youngster is noticeable. The upperparts of the plumage are dark brown with light brown edges except three small tufts of downy light gray feathers on the back. The underparts are now buffy, streaked with dark brown, and the head is dark except the ear and cheek region which is buffy. The tail is dark brown crossed with light bars and with a buffy terminal band, and the tarsi are greenish yellow.

*May 24*—At 11:20 a. m. the hawklet called for food in a vigorous manner and repeated the call about 15 times, but neither the female nor the male appeared at this time. At 12:20 the male arrived on the ledge with food, dropped it in the corner of the nest, but made no effort to feed the hawklet. In a few minutes the male left the ledge. The hawklet made no attempt to feed itself. At 2:50 the female arrived on the ledge and fed the young.

*May 25*—At 12:20 the female flew to the ledge and remained close to the hawklet for several minutes, then flew off. At 2:30 the female was perched on top of a skyscraper feeding on a pigeon. At 3 p. m. a man walked on the roof above the nesting ledge; both parents circled in the air above the roof greatly excited and screaming; fifteen minutes later the man left the roof. The hawklet at this time has the black "moustache" which appears to be complete.

*May 26*—Hawklet 38 days old. It made its first flight today. At 11:50, beating its wings and lifting itself up about a foot above the

ledge, it flew the entire length of the ledge, a distance of 12 feet and then landed at the other end of the ledge. Just as the hawklet finished its first flight, the male arrived on the ledge and dropped food in front of the hawklet who started eating it at once. It is possible the hawklet may have seen the parent coming from some distance with food which may have induced the hawklet to make the flight over the ledge. After the male brought the food, he remained only a few minutes and then flew off the ledge.

*May 27*—The parents do not come to the ledge as frequently as heretofore. They are now observed more often on top of close-by skyscrapers, probably standing guard. When the parents come to the ledge now, they usually drop the food on the ledge and leave immediately. At 12:35 the male flew in and perched on a parapet above the nesting ledge, remained there a few minutes, then flew down to the ledge, dropped a Starling, and flew off. The hawklet started eating the food at once. The hawklet now appears fully as large as the male.

*May 29*—Hawklet 41 days old. Mr. William W. Lukens, Jr., informed me that at 10:30 he observed the hawklet was no longer on the nesting ledge, but had flown straight down some 25 feet to another ledge just below on the same building. Lukens stated the parents were greatly excited, flying around the hawklet who was calling continuously for food. The parents did not feed the hawklet at this time, possibly to induce it to leave the ledge and fly off with them, but it did not leave the ledge. About 15 minutes later one of the parents brought a Starling, but made no attempt to feed the bird.

*May 30*—I observed the hawklet inside a large hole in the coping in the back part of the same ledge, eating a pigeon which, no doubt, had been placed there by one of the parents. After the bird finished eating, it came out of the opening in the coping to the ledge and stood looking around. In a few minutes a pigeon flew to the ledge and perched within five feet to the right of the hawklet, and a few minutes later another pigeon flew to the ledge and perched about five feet to the left of the hawklet. The hawklet appeared to be greatly interested in both pigeons, first looking at one and then the other, but the pigeons did not show any fear of the hawklet at all. Shortly thereafter both pigeons left the ledge. The female was observed early this morning when she was calling loudly from the top of the Land Title Building, apparently keeping in touch with the hawklet. The hawklet's mantle appeared bluish-gray in the sun today, similar to the color of the male.

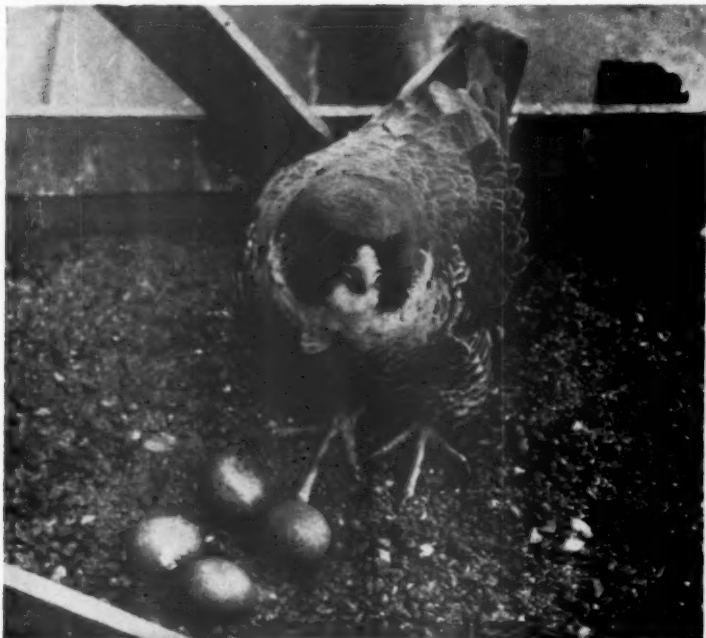
*May 31*—Hawklet 43 days old. Today the young bird left the city hall building, where it was hatched, and flew for the first time a distance of 300 feet to the base of the marble dome of the Girard Trust Company



DUCK HAWKS. (Top) NEST WITH ONE YOUNG AND ONE INFERTILE EGG. PARENT WITH FOOD. CITY HALL BUILDING, PHILADELPHIA, MAY 6, 1949. PHOTOGRAPH BY 'EVENING BULLETIN.' (Bottom) FALCON TURNING TO MAKE HORIZONTAL ATTACK AT NEST SITE ON SUN LIFE BUILDING, MONTREAL, CANADA. PHOTOGRAPH BY E. HARPER HALL.



FEMALE DUCK HAWK ON EGGS. SUN LIFE BUILDING, MONTREAL, CANADA.  
PHOTOGRAPH BY E. HARPER HALL.



DUCK HAWKS. (Top) FEMALE WITH EGGS. (Bottom) FEMALE WITH YOUNG 29 DAYS OF AGE. BOTH PHOTOGRAPHS MADE ON SUN LIFE BUILDING, MONTREAL, CANADA, BY E. HARPER HALL.



at Broad and Chestnut Streets, Philadelphia. The base of the dome is 90 feet above the street pavement and 80 feet across the street from my office windows in the Land Title Building. The hawklet remained on the base of the dome about 15 minutes, then flew another 500 feet south along Broad Street, and perched on top of a low part of the Fidelity-Philadelphia Trust Building, where it remained for one hour; it flew back, north on Broad Street, to the base of the dome of the Girard Trust Building, another 500 feet, having made a record on this day of flying a total distance of 1,300 feet on its first long flight. On its return to the base of the dome, it remained there for several hours and provided an excellent opportunity for observation. The female, which was now on top of the Land Title Building across the street from the Girard Trust Building dome, flew down to the base of the dome, but brought no food and left in a few minutes. The hawklet now called loudly for food. At 2:40 the male arrived on the base of the dome, but did not bring any food and left the dome within a few minutes. At 4:30 both parents arrived on the base of the dome at the same time, and the male brought a Starling and dropped it on the base; then both parents flew away. The hawklet was apparently very hungry, for he did not even stop to pluck the feathers of the Starling, but immediately tore into the body for the flesh.

*June 1*—At 10 a. m., the hawklet was no longer on the base of the dome. At 1 p. m., Mr. John C. Holinger stated he had observed the hawklet from the 27th floor of the Girard Trust Building perched on top of the nearby Commercial Trust Building which is about 300 feet high. The hawklet perching on the top of this building at such a height four days after leaving the nesting ledge indicates how rapidly a hawklet's flying power develops and improves.

*June 2*—The hawklet was observed on a ledge 361 feet high on the city hall tower. At 12:45 both parents flew to this ledge and the male brought food to the hawklet. The three birds, both parents and the hawklet, were now together on the same ledge. At 1:40 the hawklet left the ledge and made a beautiful flight, high in the air, between the city hall tower and the Commerical Trust Building, flying a distance of about 600 feet. While in the air the hawklet sailed almost the entire distance without a beat of the wing, until it was ready to perch when it beat its wings a few times. The flight appeared to be almost as perfect as that of an adult.

*June 6*—Hawklet 49 days old. Mr. Holinger informed me that at 7 p. m. he observed the hawklet and one of the adults together high in the air above the city hall tower, hovering and beating their wings; they were so close together that he was fairly certain the hawklet was

taking food from the parent in the air. On June 10, at 6:20, he again observed the hawklet and one of the parents above the top of the Sun Oil Building hovering in the air with wings beating, and he is certain the parent was feeding the hawklet. These observations were made with powerful binoculars. Referring to young Duck Hawks learning how to secure food in the air, Dr. Elon H. Eaton (New York State Mus. Mem., 12, vol. 2: 101, 1914) states, "As the young begin to fly the parent birds fly by with prey in their talons, and the young rise to snatch it from them in mid-air as they pass."

*June 23*—Hawklet 66 days old. On this day, sometime in late afternoon, and probably attempting to capture prey (perhaps a pigeon) flying low alongside one of the walls of the city hall building, where the adult hawks had often been observed chasing pigeons, the hawklet, perhaps due to inexperience, flew or dropped down into a large light-well of the city hall building. This light-well provides light to the city hall basement windows, is four feet wide, 90 feet long and 15 feet deep, and is surrounded on the three sides with an iron grating four feet high above the street pavement. The hawklet after flying or dropping into this deep light-well found itself unable to fly up and out of this narrow well; when it became dark, it started screaming and making a loud wailing noise. This attracted the attention of many persons who surrounded the light-well. The Society for the Prevention of Cruelty to Animals was called and asked to get the bird out of the well. This organization secured the hawklet and transferred it the next morning to the Philadelphia Zoo. A few days later I called Mr. John A. Griswold, Curator of Birds at the Philadelphia Zoo, explained the history of the hawklet, and suggested that since the bird was uninjured I should like to release it where I had been observing the parents and the hawklet together in order that it might make a contact with the parents. Mr. Griswold agreed to turn the bird over to me to release.

On June 28, with the assistance of J. C. Holinger and William L. Moore I transported the hawklet to the terrace of the 27th floor of the Girard Trust Building. When we opened the carton the bird came out very slowly and, much to our surprise, did not fly off at once, but stood very still for several minutes in front of us, as if it were trying to get its bearings. Suddenly it started to hop along the terrace floor, away from the group; it moved for a distance of 25 feet, then stopped hopping, beat its wings vigorously for about five minutes and at the same time made an effort to raise itself into the air. Possibly the bird was merely preparing itself for flight by exercising its wings, since there had been no opportunity for the bird to use its wings during

the past five days while it was a captive in a cage. In a few minutes, however, the hawklet flew up about four feet to the iron rail of the terrace where it remained about ten minutes, looking across the air toward the city hall tower where it had been flying for several days before it became a captive. It then flew off the rail into the air about 450 feet above ground where I had observed it a number of times before. The hawklet sailed in a circle a few times, and then suddenly we observed the female flying in to join the hawklet, and within a few minutes the male joined the party. The three members of the family circled for at least 30 minutes and then each bird flew to a separate ledge on the city hall tower.

On June 29, at 7 p. m., 24 hours after the hawklet was released, Holinger reported he observed both parents and the hawklet in the air above the city hall tower. Thereafter, from time to time throughout the entire fall and winter, I observed the Duck Hawks in the air from my office window. In 1950 the Duck Hawks were again present at the same location during the breeding season, but despite a considerable search we were unable to locate the nesting site.

*Glenn Road, Ardmore, Pennsylvania, November 14, 1950.*

## DISTRIBUTIONAL NOTES ON SOME PHILIPPINE BIRDS

BY D. S. RABOR

SINCE 1947 I have been engaged in teaching biology in Silliman University, Dumaguete City, Negros Island, Philippines. With what time I could spare from teaching I have carried on intensive studies on the land vertebrate fauna of the Philippines, beginning with those of Negros. The Chicago Natural History Museum is co-operating with me in these studies by providing the necessary funds and equipment.

In connection with the study of the bird fauna of Negros and nearby islands, approximately 2500 specimens have been collected to date. These include both resident and migrant forms. As a result of the present studies, 229 bird forms are now known from Negros Island. Of these 36 are new additions to the avifaunal list of this locality, including one species (Rand and Rabor, MS.) and two subspecies (Rand, *Natural History Miscellanea*, Nos. 59 and 72, 1950) described as new to science. Rand (*Fieldiana, Zoology*, 31 (48): 571-596, 1951) reported previously on 14 of the forms newly added to the bird list of Negros. The present paper reports 19 additional new bird records from Negros, two from Cebu and one from Mindanao.

The specimens collected in the course of these studies have been divided between the Chicago Natural History Museum and Silliman University. To show the disposition of the specimens of the species discussed, the initials of the institution or institutions where the specimens are kept are placed in parenthesis after the specimen record or records. The Chicago Natural History Museum is given as (CNHM) and Silliman University as (SU).

*Podiceps ruficollis philippensis* (Bonnaterre), RED-THROATED DABCHICK.—Cebu, Buhisan: 1 adult male, October 24, 1950 (CNHM). Wing, 105 mm.; culmen from base, 25.5.

This is the first record of the species on Cebu Island. The Cebu bird resembles Negros birds in its wing measurement, the color of under parts, and the amount of white at the base of the outer webs of the secondaries. These are intermediate between Luzon *philippensis* and Mindanao *colabato* and are referred to the former.

*Sula sula rubripes* Gould, RED-FOOTED BOOBY.—Negros, Piapi, Dumaguete City: 1 immature male, August 16, 1938 (SU).

The Red-footed Booby is recorded for the first time from Negros Island. The bird, in very weak condition, entered a fisherman's hut near the beach, on the evening of August 16, 1938, during an exceptionally hard blow of the southwest monsoon. It must have been blown off its course by the prevailing strong winds, for its home area is among the small islands along the east coast of Palawan.

*Mesophoyx intermedia intermedia* (Wagler), LESSER EGRET.—This is the first record of the Lesser Egret from Negros Island. Two adult males were sent on different dates during November, 1949, to the Biology Department of Silliman University, where I examined them. These birds were secured in a vacant rice field at the foothills of Tanjay. One or two birds were also observed several times feeding in the vacant rice fields in the foothills of Santa Catalina, in the southwestern part of Negros Island, during November and December of four different years.

*Ardeola bacchus* (Bonaparte), CHINESE POND HERON.—Negros, Piapi, Dumaguete City: 1 immature female, October 23, 1948 (CNHM). This is the first record of the species from Negros Island and the first time it has been reported in literature as part of the avifauna of the Philippines. Hachisuka had a male specimen in full adult dress collected on Luzon Island, but this bird has not been reported in the literature. Dr. S. Dillon Ripley of the Peabody Museum, Yale University, showed me this specimen which is with the Hachisuka Collection acquired by that institution.

The Negros bird was taken while it perched among the branches of a bent bamboo cane that overhung a creek. It had just come from a small creek near by where it was first seen standing hunched up beside the flowing waters.

The bird must have been a straggler from Borneo, which is part of its normal range.

*Ixobrychus cinnamomeus* (Gmelin), CINNAMON LEAST BITTERN.—Negros, Santa Catalina: 1 adult male, December 28, 1947. Candomao, Tolong: 1 adult female, April 17, 1950 (SU). The Cinnamon Least Bittern is here recorded from Negros for the first time, although it is rather a widespread resident in most of the islands of the archipelago.

*Anas querquedula* Linné, GARGANEY TEAL.—Negros, Silliman Farm, Dumaguete City: 1 adult male, May 24, 1951 (CNHM). The Garganey Teal is recorded for the first time from Negros Island. It is a regular winter visitor to the Philippines but

had been recorded only from Calayan and Luzon. The present specimen is in nearly full breeding plumage.

*Pernis ptilorhyncus orientalis* Taczanowski, ASIATIC HONEY BUZZARD.—Negros, Luzuriaga: 1 immature male, February 5, 1950 (CNHM). Wing, 422 mm.; culmen from base, 40. The Asiatic Honey Buzzard is recorded for the first time from Negros Island. The species is a winter visitor but is rare on the few islands of the archipelago where it has been recorded.

*Accipiter soloënsis* (Horsfield), CHINESE GOSHAWK.—Negros, Batinggil, Dumaguete City: 1 adult male, October 29, 1950. Siaton: 1 immature male, October 7, 1950 (CNHM). Wing: adult male, 196; immature male, 191. Culmen from base: 18, 18 mm.

This is the first record of the Chinese Goshawk from Negros Island. The species is a rare winter visitor to the Philippines and had been recorded on Banton, Cagayan-cillo, Luzon, and Mindanao.

*Haliaeetus leucogaster* (Gmelin), WHITE-BREASTED SEA EAGLE.—The White-breasted Sea Eagle is recorded for the first time from Negros Island, based on several sight records of the bird in flight near the coast of Siaton, Tolong, and Basay in April, May, and June, 1949–50. No specimen has been actually secured, but two immature birds were seen in Dumaguete City, in September, 1949, in a barber shop where they were kept as pets. The owner reported that the young birds were taken from a nest sometime that June, in Basay, in the southwest coast of the island.

*Megapodius freycinet pusillus* Tweeddale, MEGAPODE.—Negros, San Carlos: August, 1948 (3 eggs) (SU). The Philippine Megapode is included in the avifaunal list of Negros Island for the first time, based on the finding of three eggs near the coast of San Carlos, in August, 1948. The people along the coasts of Negros know this bird well but, so far, actual collections on the island have never yielded any specimen of this species. The bird has been collected on Cebu, very close to Negros. The Negros bird most probably belongs to the race *pusillus*, the most widely distributed form in the Philippines.

*Rostratula benghalensis benghalensis* (Linné), PAINTED SNIPE.—Negros, Amio: 1 adult male, May 28, 1948. Sibulan: 2 adult females, October 20, 1951. Siaton: 1 immature female, October 7, 1950 (CNHM and SU). Wing: male, 130 mm.; females, 136, 141, 139. Culmen from base: male, 54; females, 55, 55, 55.

This is the first record of the Painted Snipe on Negros Island. It had been recorded on several other larger islands, where it is found in very small numbers.

*Chlidonias leucoptera* (Temminck), WHITE-WINGED BLACK TERN.—Negros, Siaton: 1 immature male; 1 immature female, October 7, 1950 (CNHM). Wing: male, 206 mm.; female, 205. Culmen from base: male, 28; female, 29. The White-winged Black Tern is recorded for the first time from Negros Island. It had been recorded as a winter visitor on Mindanao.

The Negros birds are in winter plumage but still retain some of the juvenal plumage dorsally. Their small size places them with this species, rather than with the larger *C. hybria javanica* which had been recorded also from Negros as a winter visitor.

*Streptopelia chinensis tigrina* (Temminck), TIGRINE DOVE.—Mindanao, Dohinob, Katipunan: 1 immature bird, sex undetermined (CNHM). Wing, 133 mm.; culmen from base, 22. The Tigrine Dove is recorded for the first time from Mindanao. This species is common on Balabac and Palawan, but absent from the rest of the Philippines.

The single specimen collected is an immature bird, one of about seven in a flock flying in the secondary growth near the Dohinob River close to the coast. Probably the birds were blown away from their normal range on Balabac or Palawan.

*Cuculus canorus telephonus* Heine, COMMON CUCKOO.—Negros, Pola, Tanjay: 1 adult female, April 12, 1950 (SU). The Common Cuckoo is recorded for the first time from Negros Island. The species is a rare winter visitor to the Philippines and had been recorded only from Basilan, Batan, Calayan, Palawan, and Siquijor.

The single bird taken was collected in dense secondary growth in the hills.

*Cuculus saturatus saturatus* Blyth, ORIENTAL CUCKOO.—Negros, Cuernos de Negros Mountain (Talinis): 1 female, April 20, 1951. Sumalering, Siaton: 1 female, no definite date, but about end of April, 1951 (CNHM). Wing: 187, 197 mm.; culmen from base: 27, 26.

This species is recorded for the first time from Negros Island. It is a very rare winter visitor to the Philippines having been recorded previously only from Mindanao and Palawan.

The wing measurements of the Negros specimens indicate that they belong within the range given by Junge (Temminckia, 2: 202, 1937) of "(165) 168-194 (197 mm)" for *C. s. saturatus*.

*Collocalia esculenta marginata* Salvadori, GLOSSY SWIFTLET.—Negros, Himampangan Caves, Manjoyod: 1 immature female; 1 immature of undetermined sex; 5 nestlings; 5 nests, September 15, 1948 (CNHM and SU).

The Glossy Swiftlet is recorded for the first time from Negros Island. Large numbers of this swiftlet roost and nest inside the caves and overhang of the Himampangan cliffs. The nest is typically a half-cup attached to the rock walls well inside the shallow caverns and in the cavities under the over-hanging rocks. It is composed of plant fibers and moss, well-glued together with the birds' hardened saliva. Some of the nests are made on top and inside old ones, but the two can easily be separated from each other. The nest cavity measures: front to attached wall, 36 mm.; side to side, 58; depth, 32; thickness of nest wall in front, 19; width at attached portion, 90.

*Hirundo rustica gutturalis* Scopoli, BARN SWALLOW.—Negros, Sibulan: 3 immature males, 1 immature female, October 21-22, 1950 (CNHM and SU). Wing: males, 113, 114, 112; female, 110. Culmen from base: males, 12, 12, 11; female, 12.

This is the first record of this swallow on Negros Island, although the species is a very common winter visitor to the Philippines. At the time of collection, the many swallows seen in the locality were still in immature plumage.

*Hirundo striolata striolata* Temminck and Schlegel, MOSQUE SWALLOW.—Negros, Siaton: 3 males; 3 females, October 7, 1950 (CNHM and SU). Wing: males, 120, 117, 119 mm.; females, 122, 124, 118. Culmen from base: males, 9, 10, 11; females, 10, 11, 11.

The Mosque Swallow is recorded for the first time from Negros Island. The species is rare in the Philippines and had been recorded only from a few other islands of the archipelago.

*Locustella certhiola ochotensis* (Middendorf), ASIATIC GRASSHOPPER WARBLER.—Negros, Sibulan: 2 immature males (one in very poor condition), October 20, 1950 (CNHM). Wing, 70 mm.; culmen from base, 16.

This is the first record of the Asiatic Grasshopper Warbler on Negros Island. The species is a rare winter visitor to the Philippines and has been recorded in only a few other islands. The Negros birds were taken in dense low trees in a patch of mangrove forest close to the coast.

*Acrocephalus arundinaceus orientalis* Temminck and Schlegel, GREAT REED WARB-

LER.—Negros, Dumaguete City: 1 adult male, October 17, 1950. Sibulan: 5 adult males, 4 adult females, 1 immature female, October 15–22, 1950 (CNHM and SU). Wing: males, 85, 85, 83, 78, 82; females, 80, 83, 80, 82. Culmen from base: males, 24, 24, 24, 22, 23; females, 22, 22, 23, 22 mm.

The Great Reed Warbler is recorded for the first time from Negros Island. This species is a common winter visitor, arriving on Negros Island about the early part of October of each year and staying until March or April.

Its harsh notes are frequently heard after October, from particularly dense beds of tall grasses and reeds in marshy or swampy areas close to the sea-coast, every day during its stay, or from low densely foliated trees in mangrove forests, preferably those close to dense grass. Occasionally, the birds stay inside the dense bamboo thickets and only the loud harsh croaking notes indicate their presence there.

*Dicaeum ignipectus apo* Hartert, FIRE-THROATED FLOWERPECKER.—Negros, Dayongan, Cuernos de Negros Mountain (Talinis), 4000 feet elevation: 2 adult males, April 24–25, 1951 (CNHM). Wing: 52, 53 mm. Culmen from base: 11, 11.5.

This beautiful flowerpecker is recorded for the first time from Negros Island. The wings of the two Negros birds are shorter than those of a Mindanao bird from Todaya, Mt. Apo, which measured 56 mm. The culmen measurements in both are about the same. There is no difference in plumage between the Negros and Mindanao birds.

*Zosterops palpebrosa siquijorensis* Bourin and Worcester, ORIENTAL WHITE-EYE.—The records of occurrence of *Z. palpebrosa siquijorensis* for Negros have rested on the specimens collected by Whitehead, in 1896 on Canlaon Volcano, Negros Island, and on the specimens collected by Andres Celestino shortly after. Mayr (Zoologica, 30 (3): 116, 1945) has shown that Whitehead's specimens were misidentified and found them to be an undescribed race of *Z. montana*, which he called *Z. m. pectoralis*. Celestino's specimens were in the Philippine Bureau of Science Collection which was later destroyed by fire during the recent war.

Intensive collecting on Negros Island since 1947 failed to yield *Z. p. siquijorensis* either in the lowlands or in the highlands, although *Z. m. pectoralis* and *Z. nigrorum nigrorum* were both found to be common. In view of the probability of misidentification of the Celestino specimens and the impossibility of checking on it now, I cannot admit *Z. p. siquijorensis* to the Negros avifaunal list.

*Lonchura punctulata cabanisi* (Sharpe), NUTMEG MANNIKIN.—Cebu, Antuanga: 3 adult males; 2 adult females; 2 immatures, of undetermined sex, October 15–16, 1950 (CNHM).

The Nutmeg Mannikin is recorded for the first time from Cebu. The species is rather common on Luzon, Mindoro, and Panay, but has never been taken or even observed on Cebu prior to 1934, although the various bird stores in Cebu City carried this species as a common cage bird for sale, getting their supply from Manila and environs. It is probable that some of these caged birds escaped and established themselves in the hills behind the city.

*Silliman University, Dumaguete City, Negros Island, Philippines,  
September 27, 1951.*

## IN MEMORIAM: LYNDS JONES

BY S. CHARLES KENDEIGH

BOTH parents of Lynds Jones, Publius Virgilius and Lavinia Burton, came from New England families, and Lynds was the eighth generation in this country. The father was first a millwright and later a farmer and pioneer. The son, Lynds, was born on January 5, 1865, at Jefferson, Ohio, but when he was only three months old, the family moved to a farm five miles northwest of Grinnell, Iowa. There were six sons and one daughter in the family. Death came to Lynds on February 11, 1951, at Oberlin, Ohio, at the age of 86 years. Arthritis of the lower spine made him more or less helpless during his last two years, and the development of arterio-sclerosis contributed to his passing. Lynds Jones will long be remembered as a teacher, an editor, a leading field scientist of his day, a valued citizen of his community, and a gentleman.

I wish to acknowledge my debt to a son, Dr. George T. Jones, for many details of information used in this article and to the biography of Lynds Jones by Mrs. H. J. Taylor, published in 'The Wilson Bulletin' (Vol. 50: 225-238, 1938) from which I have drawn freely. The photograph is an enlargement from a snapshot taken in his home at Christmas time, 1948, shortly before his 84th birthday and provided me by his son.

Lynds Jones developed an interest in birds and in the science of ecology early in life. Doubtless this was influenced by his early environment in Iowa where his home was nestled at the edge of a grove of trees with unbroken prairie stretching away to the west. He early began to speculate why different species of birds occurred in different habitats and to make a collection of eggs. He was encouraged in these interests by an older neighbor boy, who was an expert collector and taxidermist, and by his country school teacher, who incidentally later became his father-in-law. Coues' "Key to North American Birds" and Samuel's "Nests and Eggs of New England Birds" were two books that had an important influence in developing his interest and learning in ornithology. He attended Grinnell College for two years but then transferred to Oberlin College in Ohio because of the greater variety of science courses offered there. His A.B. degree was obtained in 1892, his M.S. degree also from Oberlin College in 1895, and his Ph.D. degree from the University of Chicago in 1905. While at Chicago he came under the influence of Henry C. Cowles and V. E. Shelford whose studies on the plant and animal ecology of the



*Lynds Jones.*



sand dunes at the south end of Lake Michigan may well have crystallized his own interest in ecology. His doctorate thesis, however, was concerned with the development of nestling feathers in birds.

Lynds Jones began his teaching career at Oberlin College as soon as he graduated in 1892, serving first as assistant and then as instructor in zoology and becoming associate professor in 1905. He was promoted to the rank of full professor in 1922 and professor emeritus in 1930. In addition to teaching, he also served Oberlin College first as assistant curator and then as curator of the natural history museum.

In 1895, the college permitted Lynds Jones to offer a course in ornithology, the first such course to be offered in any American college or university. The course involved learning how to recognize species of birds from museum specimens, from unlabeled pictures that were shown on the classroom screen by means of a carbon arc balopticon, and from field trips. The early morning bird walks, involving a peak enrollment of 120 students and conducted by the instructor and his assistants, became a well known feature during the spring in the community life of the Oberlin village.

In the summer of 1910 Professor Jones offered for the first time a field course entitled "Ecology," with all the work to be done on Pelee Island in Lake Erie. A year's course in ecology was introduced in 1913 in which plant ecology was stressed almost as much as animal ecology, and an undergraduate major was offered in 1915. In 1926, advanced animal ecology and research were given and a master's degree in ecology was made available to those who continued for a full year of graduate training in this field. These offerings in ecology stimulated several of his students to continue their training at other universities and to make the teaching and study of ecology their life-careers.

An interesting incident in the pioneering work that Dr. Jones did for the teaching of ornithology and ecology in schools of higher education pertains to the difficulty he encountered with the head of the Department of Zoology. This gentleman considered these subjects unworthy of serious attention at the college level and tried to eliminate the courses from the curriculum. This opinion, however, was not shared by the rest of the college faculty. The result of the conflict was that in 1908 Dr. Jones' title was changed to Associate Professor of Animal Ecology, and he was given an autonomous subdepartment of animal ecology freed from the control of the Department of Zoology. In 1922, an entirely independent Department of Animal Ecology was recognized by the college, the only such department in the country. When Dr. Jones retired, the department was discontinued; courses in animal ecology and ornithology were abandoned.

Much of Dr. Jones' teaching was conducted during the summer months when bird activity was greatest, and ecological distinctions most conspicuous. Much of this instruction was away from the Oberlin campus and included field studies at the Ohio State University Lake Laboratory at Cedar Point, on Pelee Island in Ontario, and at Marblehead, Ohio. In 1915, he conducted the first of 13 class trips to the Pacific Coast to study birds and ecology. On the first two trips the group went by train to Seattle and then by Indian launch and canoe from camp to camp along the west coast of Washington. Many stops were made to inspect island nesting-colonies of sea birds. After an interruption due to the war, the trips were started again in 1919 but this time by automobile in order to visit en route as great a variety as possible of different habitats. Everyone slept out in the open each night for a period of six or eight weeks. Because of the many unique adventures and experiences encountered, these trips remain an outstanding memory to all who were privileged to go on them. It is unfortunate that the story of these trips has never been written. Many persons considered that the course work, field trips, and personal contacts with Professor Jones were the most important and most pleasantly remembered experiences of their college life.

Dr. Jones was one of the founders and 36 original members of the Wilson Ornithological Club in 1888, and throughout his active life he was one of the mainstays and promoters of this organization. He held the presidency for 13 years, was secretary for 2 years, treasurer for 8 years, and editor for 36 years or from 1888 to 1900 and from 1902 to 1924, inclusive. The Wilson Ornithological Club actually did not formally recognize the office of editor until 1914, although the "Bulletin" had carried on its cover page, "Edited by Lynds Jones," since 1896. The name, *The Wilson Bulletin*, was first used in 1894. Beginning in 1888 the official organs of the Club were 'The Curlew,' 'The Ornithologists' and Oologists' Semi-Annual,' 'The Wilson Quarterly,' and 'The Journal.' Lynds Jones had the chief responsibility of gathering and editing the material that went into these various journals from club members, although he was simultaneously serving also as secretary from December 1888 to 1890, president from 1891 to 1893, treasurer from 1894 to 1901, president again from 1902 to 1908, and on the executive council for several following years. He served a final term as president from 1927 to 1929. From 1896, when 'The Wilson Bulletin' first began to publish regular contributions of a varied sort, through 1909, by which time it had become well established, Dr. Jones averaged seven signed articles per year besides numerous editorials and literature reviews. This nurturing and coddling

of 'The Wilson Bulletin' through its early years of growth made possible the development of this periodical to the full maturity that it shows today.

Jones became a Member of the American Ornithologists' Union in 1888 and a Fellow in 1905. He was also a member of the American Association for the Advancement of Science, the Ecological Society of America, and the Ohio Academy of Science.

One of Dr. Jones' main scientific interests concerned the migration of birds, and he continued collecting data on the arrival and departure dates for all species, even after his retirement from teaching. A summary, published about 1935, includes records for 40 years. In this connection, he was a regular contributor for the Oberlin region to "The Season," published by 'Bird-Lore,' first in 1900 and 1901, then again later, when this department was revived, from 1917 to 1922.

In 1903, Dr. Jones published "A Revised Catalogue of the Birds of Ohio." This major contribution included the scientific and popular names of each species as well as synonyms, the status and migration of each species, and citations to literature. During the same year he appeared as joint author with a former student, William L. Dawson, of "Birds of Ohio" which was a more pretentious and popular volume.

Through the medium of his editorship of 'The Wilson Bulletin,' Dr. Jones early promoted the taking of daily bird counts as well as actual censuses over unit areas. Perhaps this early encouragement of field studies from 1898 to 1900 may have had something to do with the initiation of the Christmas bird "census" annually conducted by 'Bird-Lore' (now 'Audubon Magazine') and with the more recent development of breeding-bird censuses that have become so popular. Other scientific interests and contributions of Dr. Jones dealt with the roosting habits of grackles, life-history studies, and with local faunal lists (Lorain County, Ohio; Cedar Point and vicinity, Ohio; Lake Erie islands; and the coast of Washington state). There are, altogether, 142 articles listed in his bibliography, although many are short.

Lynds Jones had many interests besides birds. One of these was sports. He helped to organize the first football team at Oberlin College and was an outstanding player on the teams of 1891 and 1892. In later years he excelled at golf and tennis and regularly attended all sports events of the college.

Dr. Jones assumed his share of duties in the community life of Oberlin. He served on the village council and various special committees. He was chairman for some years of the Oberlin School Board and a trustee of a tuberculosis sanitarium. During the second World War he was chairman of the local draft board. He was honored

with life membership in the Oberlin Chamber of Commerce. He served as treasurer and deacon of the Congregational Church at Oberlin.

Lynds Jones married Clara Mabelle Tallmon in 1892 and the two had a long and happy life together. Dr. and Mrs. Jones had five children: Lynds Leo, now an electrical contractor; Theodore Burton, deceased; George Tallmon, Associate Professor of Botany at Oberlin College; Beth, whose husband, Max W. de Laubenfels, is Professor of Zoology at Oregon State University; and Harold Charles, Professor of Biology, East Carolina Teachers College.

This memorial may be closed with what a former student wrote some years ago: "Dr. Jones is a very quiet, modest, retiring, but effective man; a teacher who places the world of nature before you, and with a few guiding remarks expects you to make the discoveries for yourself—his teaching has lasting and ever increasing value. It has contributed to the joy of living . . ."

#### BIBLIOGRAPHY OF LYND JONES

1887. Birds' nests. *Agassiz Companion*, 2 (9): 97-98.
1888. An early spring morning. March 17th 1888. *Ibid.*, 3 (5): 54-55.
1888. The fifth annual convention of the I. A. A. A. *Ibid.*, 3 (9): 102.
1888. Martins vs. blue birds. *Ibid.*, 3 (10): 114.
1889. Wood Thrush. *Curlw*, 1: 37-38.
1889. A list of birds found in eastern Jasper and western Poweshiek counties, Iowa. *Curlw*, 1 (6): 50-53; (7): 57-60.
1889. The Bell's Vireo. *Vireo bellii*. *Ornithologists' and Oologists' Semi-Annual*, 1 (1): 41-42.
1889. The Yellow-winged Sparrow. *Coturniculus passerinus*. *Ibid.*, 1 (2): 8-9.
1889. The Chewink; Towhee. *Pipilo erythrophthalmus*. *Ibid.*, 1 (2): 25-26.
1890. The Prairie Horned Lark, *Otocoris alpestris praticola*. *Ibid.*, 2 (2): 27-29.
1890. The Thrushes. *Ibid.*, 2 (2): 36-38.
1892. The Prairie Horned Lark. *Wilson Quart.*, 4 (2): 54-59.
1893. "Owls": Report of Wilson Ornithological chapter of the A. A. (Agassiz Association). *Pop. Sci. News*, 27: 70-72.
1895. Bird migration at Grinnell, Iowa [and Oberlin, Ohio]. *Auk*, 12: 117-134, 231-244.
1895. Record of the work of the Wilson Chapter for 1893 and 1894 on the Mnioiltidae. *Wilson Bull.*, 7 (Bull. 4): 1-20.
1896. Notes on the summer range of Dickcissel (*Spiza americana*), Grasshopper Sparrow (*Ammodramus savannarum passerinus*), and Henslow's Sparrow (*Ammodramus henslowii*), in 1894 and 1895. *Wilson Bull.*, 8 (Bull. 6): 1-2.
1896. Unusual winter birds at Oberlin, Ohio. *Ibid.*, 8 (Bull. 7): 7-8.
1896. Absent winter birds at Oberlin, Ohio. *Ibid.*, 8: 9-10.
1896. Notes from Oberlin, Ohio. *Ibid.*, 8 (Bull. 8): 3-4.
1896. The Bank Swallow. *Ibid.*, 8: 5.
1896. Oberlin notes. *Ibid.*, 8 (Bull. 9): 4-6.
1896. Notes from Oberlin, Ohio. *Ibid.*, 8 (Bull. 10): 5-7.

1897. Brunnich's Murre, *Uria lomvia*, on Lake Erie. *Ibid.*, 9: 16.
1897. The Oberlin Grackle roost. *Ibid.*, 9: 37-56.
1897. Arrival of Whippoorwill and Purple Martin in spring. *Ibid.*, 9: 57-58.
1897. Notes from Oberlin, Ohio. *Ibid.*, 9: 60-62.
1898. The bird census. Oberlin, Ohio. *Ibid.*, 10: 5-9.
1898. The Lorain County, Ohio, winter bird fauna for 1897-8. *Ibid.*, 10: 17-19.
1898. Bird horizons. Lorain County, Ohio. *Ibid.*, 10: 21-23.
1898. Birds from the car window. *Ibid.*, 10: 50-52.
1898. Summer bird study. *Ibid.*, 10: 53-54.
1898. Changes in the avifauna of Lorain County, Ohio. *Ibid.*, 10: 61-63.
1898. Anseres which visit the Oberlin Waterworks Reservoir. *Ibid.*, 10: 66-68.
1899. The Lorain County, Ohio, 1898 horizon. *Ibid.*, 11: 2-4.
1899. The work for 1899. *Ibid.*, 11: 12-13.
1899. The Lorain County, Ohio, winter bird fauna for 1898-9. *Ibid.*, 11: 19-21.
1899. A March horizon. *Ibid.*, 11: 22-24.
1899. Birds in a snow-storm. *Ibid.*, 11: 25-26.
1899. Brunnich's Murre, *Uria lomvia* in Lorain County, Ohio. *Ibid.*, 11: 26.
1899. The migration of Killdeer, Meadowlark, Robin and Bluebird. *Ibid.*, 11: 33-35.
1899. All day with the birds. *Ibid.*, 11: 41-45.
1899. [Chimney Swifts.] *Ibid.*, 11: 45-46.
1899. Summer bird study. *Ibid.*, 11: 52-54.
1899. June censuses. *Ibid.*, 11: 59.
1899. Carolina Wren (*Thryothorus ludovicianus*) in Lorain County, Ohio. *Ibid.*, 11: 76-77.
1899. The year's work. *Ibid.*, 11: 84-85.
1900. Warbler songs (*Mniotiltidae*). *Ibid.*, 12 (Bull. 30): 1-57. [Also issued as "The songs of the warblers (*Mniotiltidae*). Oberlin College (Ohio) Lab. Bull. 10: 1-57, 1900.]
1900. Kirtland's Warbler (*Dendroica kirtlandi*) at Oberlin, Ohio. *Ibid.*, 12 (Bull. 32): 1-2.
1900. Another new bird for Lorain County, Ohio. *Ibid.*, 12: 8-9.
1900. All day with the birds. *Ibid.*, 12: 10-12.
1900. A summer reconnaissance in the west. *Ibid.*, 12: 1, 10-38.
1900. On methods in teaching ornithology at Oberlin College. *Bird-Lore*, 2: 14-18.
1900. Spring migration at Oberlin, Ohio. *Ibid.*, 2: 57.
- 1900-1901. Birds and seasons. Oberlin, Ohio. *Ibid.*, 2: 186-187; and 1901-3: 25-26, 64-65, 101-102, 136-137, 165-166.
- 1901-1929. The Christmas bird census, Oberlin, Ohio. *Ibid.*, 3: 31; and 1903, 5: 19; —1923, 25: 33; —1924, 26: 38; —1925, 27: 49; —1929, 31: 50.
1901. The first 20th century horizon at Oberlin, Ohio. *Wilson Bull.*, 13: 11-13.
1901. A new bird for Lorain County, Ohio. *Ibid.*, 13: 43-44.
1901. An open question. *Ibid.*, 13: 45.
1901. A suggestion for work. *Ibid.*, 13: 49-52.
1901. All day with the birds. *Ibid.*, 13: 57-61.
1901. Five days among the islands of Lake Erie. *Ibid.*, 13: 70-71.
1901. A criticism. *Ibid.*, 13: 76-78.
1902. Some winter records for Lorain County, Ohio. *Ibid.*, 14: 20-23.
1902. Bird studies in Lorain County, Ohio. *Ibid.*, 14: 37-58.
1902. A bird new for Ohio. *Ibid.*, 14: 71.

1902. Kirtland's Warbler (*Dendroica kirtlandi*) again in Ohio. *Ibid.*, 14: 104-105.  
1902. All day with the birds. May 7, 1902. *Ibid.*, 14: 125-129.  
1902. Winter birds. *Ibid.*, 14: 129-132.  
1903. The New Year's Day bird census. Oberlin, Ohio. *Ibid.*, 15: 29.  
1903. All day with the birds. May 16 at Oberlin, Ohio. *Ibid.*, 15: 60-62.  
1903. Brewster Warbler (*Helminthophila leucobronchialis*) in Ohio. *Ibid.*, 15: 68-69.  
1903. Unusual birds at Oberlin, Ohio. *Ibid.*, 15: 75.  
1903. The terns of the Weepeeket Islands, Massachusetts. *Ibid.*, 15: 94-100.  
1903. A Bob-White covey. *Ibid.*, 15: 105-106.  
1903. A December Hermit Thrush. *Ibid.*, 15: 112-113.  
1903. Black Skimmer at Woods Hole, Mass. *Ibid.*, 15: 113.  
1903. Some unusual Oberlin records. *Ibid.*, 15: 118-119.  
1903. A revised catalogue of the birds of Ohio. Ohio State Acad. Sci., Spec. Paper No. 6: 1-241.  
1903. Birds of Ohio. (Wheaton Publ. Co., Columbus, Ohio.) (Joint authorship with William Leon Dawson.)  
1904. The Cerulean Warbler (*Dendroica rara*). Wilson Bull., 16: 2-4.  
1904. A double nest of Red-eyed Vireo. *Ibid.*, 16: 14-15.  
1904. The New Year bird census, Oberlin, Ohio. *Ibid.*, 16: 19 (with D. E. Nye and F. B. Wolfe).  
1904. An improvident Kingbird. *Ibid.*, 16: 22.  
1904. All day with the birds. Oberlin, Ohio. *Ibid.*, 16: 37-38, 40-50.  
1904. Spring migration in Loraine County, O., 1904. *Ibid.*, 16: 55-57.  
1904. July Fourth censo-horizons. *Ibid.*, 16: 76-80.  
1904. Northern Ohio notes. *Ibid.*, 16: 92-93.  
1905. How to study birds. Ohio School Journ., 2 (1): 6-7.  
1905. Some further suggestions for bird study. Wilson Bull., 17: 61-63.  
1905. Additions to the birds of Ohio. *Ibid.*, 17: 64.  
1905. The drumming of the Ruffed Grouse. *Ibid.*, 17: 94-96.  
1906. The opening of the 1906 spring migration at Oberlin, Ohio. *Ibid.*, 18: 26.  
1906. A contribution to the life history of the Common (*Sterna hirundo*) and Roseate (*S. dougalli*) terns. *Ibid.*, 18: 35-47.  
1906. Two all-day records in northern Ohio. *Ibid.*, 18: 68-72.  
1906. August days with the birds. *Ibid.*, 18: 95-97.  
1906. The birds of Cleveland, Ohio, and vicinity. *Ibid.*, 18: 110-112.  
1906. Some migration records along the Cedar Point Sand Spit, Erie County, Ohio, 1906. *Ibid.*, 18: 128-130.  
1906. Two birds new to Lorain County, Ohio. *Ibid.*, 18: 130-131.  
1906. Lorain County, Ohio, fall records, 1906. *Ibid.*, 18: 135-136.  
1907. The development of nestling feathers. Oberlin College (Ohio) Lab. Bull. 13: 1-18.  
1907. Additions to the birds of Ohio. *Ibid.*, 19: 20.  
1907. *Catharista atrata*, Black Vulture, in Harrison County, Ohio. *Ibid.*, 19: 33-34.  
1907. Ring-billed Gull, *Larus delawarensis*, in central Ohio. *Ibid.*, 19: 34.  
1907. Aspects of the spring migration of 1907. *Ibid.*, 19: 102-109.  
1907. Birds from a car window again. *Ibid.*, 19: 109-113.  
1907. Some records for the Cedar Point Sand Spit, Ohio. *Ibid.*, 19: 118-119.  
1907-1909. June with the birds of the Washington Coast. *Ibid.*, 19: 123-133; and 20: 19-26, 57-62, 189-199; and 21: 3-15.  
1907. Henslow's Sparrow in Ohio in 1907. *Ibid.*, 19: 162-163.

1908. An addition to the birds of Ohio. *Ibid.*, 20: 50.  
1908. The birds of Ohio: correction and note. *Ibid.*, 20: 51.  
1908. Another Great Black-backed Gull for Ohio. *Ibid.*, 20: 54.  
1908. Towhees unusually common in Ohio. *Ibid.*, 20: 55.  
1908. Records from Cedar Point, Ohio, winter of 1907-08. *Ibid.*, 20: 55-56.  
1908. The spring migrations at Oberlin, Ohio, 1908. *Ibid.*, 20: 158-159.  
1908. White-eyed Vireo (*Vireo noveboracensis*) in northern Ohio. *Ibid.*, 20: 159.  
1908. Ohio records. *Ibid.*, 20: 210-211.  
1909-1910. The birds of Cedar Point and vicinity. *Ibid.*, 21: 55-76, 115-131, 187-204; and 22: 25-41, 97-115, 172-182.  
1909. The Falcones of North America. (With W. F. Henninger.) *Ibid.*, 21: 77-94, 205-218.  
1909. New records for middle northern Ohio. *Ibid.*, 21: 158.  
1909. Early winter conditions in northern Ohio. *Ibid.*, 21: 226.  
1911. Exceptional Ohio records. *Ibid.*, 23: 60-61.  
1912. A study of the avifauna of the Lake Erie islands. *Ibid.*, 24: 6-18, 95-108, 142-153, 171-186.  
1912. Brown Thrasher at Oberlin, Ohio. *Ibid.*, 24: 193.  
1912. The case of the Bluebirds. *Ibid.*, 24: 197.  
1912. Some Cedar Point-Huron, Ohio, notes. *Ibid.*, 24: 197.  
1913. Some records of the feeding of nestlings. *Ibid.*, 25: 67-71.  
1914. Winter conditions in northern Ohio, winter of 1913-14. *Ibid.*, 26: 18-19.  
1914. A brief history of the Wilson Ornithological Club. *Ibid.*, 26: 23-27.  
1914. Two new birds for Oberlin, Ohio. *Ibid.*, 26: 106.  
1914. Bay Point, Ohio, migration notes, 1914. *Ibid.*, 26: 151-152.  
1914. Nineteen years of bird migration at Oberlin, Ohio. *Ibid.*, 26: 198-205.  
1915. Some peculiarities of the 1915 spring migration in northern Ohio. *Ibid.*, 27: 352-353.  
1916. The King Eider (*Somateria spectabilis*) in Summit County, Ohio. *Ibid.*, 28: 202.  
1916. Starlings in Ohio. *Ibid.*, 28: 202.  
1917. The May migrations, 1917, at Oberlin, Ohio. *Ibid.*, 29: 103-104.  
1917. Another new bird for Ohio. *Ibid.*, 29: 166.  
1917. A season of abundance of birds in central Ohio. *Ibid.*, 29: 166.  
1917-1922. The season, Oberlin region. *Bird-Lore*, 19: 153-154, 212, 340; —20: 22-23, 232, 431; —21: 53-54, 114-115, 185; —22: 48-49, 227-228; —23: 35, 145, 203, 307-308; —24: 45, 156.  
1918. Some Ohio records and notes. *Wilson Bull.*, 30: 120-121.  
1918. The fall migration of 1918 in northern Ohio. *Ibid.*, 30: 121.  
1919(?) Keys to birds of eastern North America. *Bird migration at Oberlin, Ohio*. Publ. privately, pp. 1-24.  
1923. Some migration notes from Oberlin, Ohio. *Wilson Bull.*, 35: 59.  
1927. Highway mortality and speed of flight. *Ibid.*, 39: 8-10.  
1928. A durable Barn Swallow's nest. *Ibid.*, 40: 52-53.  
1930. The sequence of the molt. *Ibid.*, 42: 97-102.  
1935. Spring bird migrations at Oberlin, Ohio, 1896-1935. Publ. privately, pp. 1-4.

*Department of Zoology, University of Illinois, Champaign, November 30, 1951.*

# OFFSHORE OBSERVATIONS OF TROPICAL SEA BIRDS IN THE WESTERN PACIFIC

BY KEITH L. DIXON AND WILLIAM C. STARRETT

DURING parts of 1945 and 1946 we made several voyages among the island groups of the western Pacific Ocean. As time permitted, counts of sea birds were made as an index to population densities in tropical waters. We tried also to determine the offshore distributions of the species encountered. The data presented here were gathered from an area of the North Pacific Ocean characterized by a fairly uniform oceanic bird fauna. Outlying stations which delimit the area selected are: a point approximately 500 miles northeast of Hawaii at about 148° W and 25° N; Ponape at about 7° N in the Caroline Islands; the vicinity of Rasa Island at approximately 24° 30' N and 131° E; and the area about the Bonin Islands, approximately 29° N. Included are waters near the Hawaiian, Marshall, Caroline, Mariana, Volcano, and Bonin island groups (Fig. 1). The northern limit of the area thus defined coincides in a general way with the January isotherm for 68° F; thus the area lies within the range of distribution of reef corals as mapped by Joubin (1912:299). The avifauna of these waters is a tropical one (Alexander, 1928:357); for example, typically temperate birds such as gulls do not occur regularly in this part of the Pacific Ocean.

Observation periods at sea are listed below:

<i>Inclusive dates within area defined</i>	<i>Route</i>	<i>Hours of observation</i>
July 6-9	Okinawa, Ryukyu Islands to Guam, Mariana Islands	13
August 1	Saipan, Mariana Islands to Iwo Jima, Volcano Islands	4
August 7-8	Iwo Jima to Saipan	8
August 21-26	Saipan to Okinawa	14
November 8-12	Tokyo, Japan, to Saipan	11½
December 9-14	Guam to Ponape, Caroline Islands	5
December 15-21	Ponape to Bonin Islands	9
January 9-12	Tokyo to Guam	14½
January 23	Guam to Rota, Mariana Islands	1½
January 25-26	Rota to Pagan, Mariana Islands	3
January 27-31	Pagan to Okinawa	14
February 19-24	Okinawa to Guam	16½
February 28-March 17*	Guam to Oahu, Hawaiian Islands	48½
March 22-26	Oahu to San Diego, California	7½
	Total	170

\* Day gained crossing International Date Line.

This report is based entirely on sight records made with 7 by 50 binoculars from the bridge of a landing-ship at a height of 55 feet above the water. Speed of the vessel varied from five to ten knots.

Efforts were made to count all sea birds observed during timed watch-periods of variable duration and frequency. The counts usually were made by a single observer. Minimal figures were taken when numbers of birds in a flock were estimated. For example, an approximation noted as "20 to 25 birds" was recorded here as 20. Exact distance from nearest land was recorded for each observation of an individual

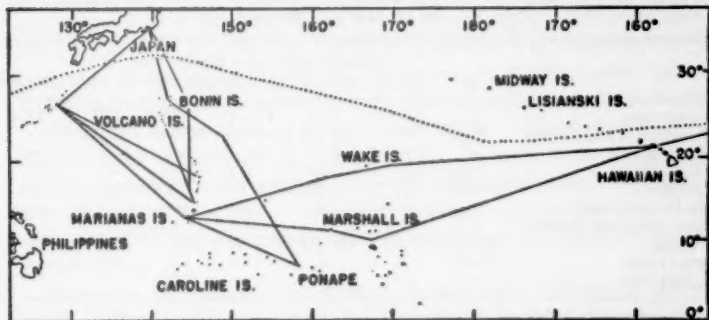


FIGURE 1.—Map of the western North Pacific Ocean showing routes traveled (solid lines). The dotted line approximates the northern limit of distribution of reef corals (modified from Joubin, 1912).

or flock. The distances were grouped later. Albatrosses, the only birds seen following the ship, were counted when first observed and additions to such flocks were counted only if they were known to be newcomers. Difficulties encountered in identification of oceanic birds led to compilation of Table 1 in which the birds are listed by generic or familial groups. Although such grouping according to higher categories masks species differences and variables such as daily and seasonal movements, it does point to fundamental differences in the offshore distribution of birds of several adaptive types. In general, the height of the breeding season for most of the tropical sea birds did not fall during the period in which our observations were made (see Fisher, 1903:775; Richardson and Fisher, 1950:304). Fewer observations were made in the area 25 to 50 miles offshore than farther out because departures from ports were made as a rule in late afternoon and arrivals during the early morning hours.

As the table shows, some types of oceanic birds range offshore more widely than do others. The tube-nosed swimmers are truly pelagic; flocks of shearwaters and petrels at considerable distances offshore are not an uncommon sight in tropical waters. While the tropic birds approach the pelagic mode of existence, they do not appear to range

as far. Perhaps this is a reflection of relative numbers and the fact that they often hunt individually. Boobies and tropical terns for the most part do not occur in numbers more than 50 miles from land. In the waters off the Marianas, they were found ordinarily foraging within 20 miles of the nearest land. Sooty and Gray-backed terns may range

TABLE 1

NUMBERS OF SEA BIRDS SEEN AT DIFFERENT DISTANCES FROM LAND, AUGUST 21, 1945, TO MARCH 26, 1946

	Nautical miles from nearest land						
	5-25	25-50	50-100	100-200	200-300	300-400	over 400
Albatrosses	—	2 (1)*	3 (1)	10 (6)	25 (3)	8 (2)	5 (3)
Shearwaters and petrels	3 (3)	1	93 (9)	20 (10)	82 (4)	2 (2)	—
Storm-petrels	—	—	1	—	—	—	—
Tropic birds	3 (1)	—	8 (4)	2 (2)	—	—	—
Boobies	40 (5)	1	3 (1)	1	2 (2)	—	—
Man-o'-war-birds	—	—	—	—	—	3 (2)	—
Sooty and Gray-backed terns	59 (2)	5 (1)	126 (3)	16 (4)	—	—	—
Other terns	51 (6)	—	—	1	—	—	—
Unidentified	—	—	—	1	11 (2)	—	—
Total number of individuals	156	9	234	51	120	13	5
Linear (nautical) miles surveyed	132	93	273	387	152	121	96

\* The figure in parentheses indicates the number of separate observations on which each total is based.

more extensively but probably do not do so during the nesting season. Large numbers of these birds indicated in the table were seen on one day and possibly represented migratory flocks.

Wynne-Edwards (1935:240) proposed an ecological classification of sea birds of the temperate North Atlantic. The three major groupings were inshore (foraging within sight of shore), offshore (seaward limits coincident with extent of the continental shelf), and pelagic. Because of the proximity of the 100-fathom line to shore in Micronesian waters, those areas lying but a few miles from the islands probably would be impoverished faunistically. Thus the feeding grounds of land-based birds might be expected to lie close to shore. This was found to be the case. Restriction of offshore birds to the proximity of land, presumably enforced by poorness of the surrounding waters, makes the distinction between inshore and offshore types difficult in the area dealt with here. Nevertheless, Wynne-Edwards' classification appears to be applicable in a general way to these tropical waters.

Accounts of the paucity of bird life in deep waters of the tropics have been summarized by Murphy (1936:88). In general, a correlation with available food may be made as shown by Jespersen (1930:14).

He found (p. 10) that the Sargasso Sea supported the least dense sea-bird populations in the North Atlantic. In those parts of the North Atlantic lying south of the 40th parallel he reported that no birds were observed on 28.1 per cent of the days spent more than 50 miles at sea. During our travels in the western North Pacific, 50 days were spent at distances greater than 50 miles from nearest land. On 14 of these days (28 per cent) no birds were seen. On a voyage from Guam to the vicinity of Wake Island, neither birds nor flying fish were seen in the period from March 1 to March 5 inclusive; four consecutive birdless days were the most recorded by Jespersen in the North Atlantic.

The following observations of individual species seemed noteworthy.

*Diomedea immutabilis*, LAYSAN ALBATROSS. Noted south of 30th parallel only to eastward of Wake Island. In those waters individuals of this species were seen singly on seven occasions; once, however, four were in sight at one time. The most southerly occurrence was that of a single individual 114 miles east of Wake Island on March 7 (latitude about 19° 40' N).

*Diomedea nigripes*, BLACK-FOOTED ALBATROSS. Noted to the west of the 180th meridian only in the latitude of Wake Island in March and northeast of the Bonin Islands in early January (see Starrett and Dixon, 1946:270).

*Puffinus leucomelas*, WHITE-FACED SHEARWATER. Single individuals were encountered rather frequently in the eastern Philippine Sea in July and August, south at least to about 16° 30' N (146 miles, 305° True from Tinian, Mariana Islands, July 9; 153 miles northwest of Saipan, August 23). On July 9, four were noted in one group and others singly. Jespersen (1933:193, 220) found this species as far south as latitude 21° N in waters south of Formosa on June 14, 1929. The breeding season of the White-faced Shearwater on islands off the Japanese coast extends from late March into October (Matthews, 1931:571). Dixon saw a single White-faced Shearwater on November 9, 160 miles east of Iwo Jima, Volcano Islands, but the species was not seen in Micronesian waters during the several subsequent months. Apparently the entire population moves into equatorial waters during the winter; specimens of *P. leucomelas* in the American Museum of Natural History from waters off New Guinea and adjacent islands were taken during the months from December to March (Ernst Mayr, letter, September 6, 1950).

*Puffinus pacificus*, WEDGE-TAILED SHEARWATER. Two flocks of 21 and 41 individuals, respectively, were seen simultaneously on August 22, at a point 100 miles, 260° True from Sariguan, Mariana Islands. Dark-bodied shearwaters were not seen in western Pacific waters

during the late autumn and winter months. However, white-bellied birds which may have represented a plumage phase of this species were noted off the southern Mariana Islands in January and February.

*Pterodroma hypoleuca*, STOUT-BILLED GADFLY PETREL. Noted occasionally well offshore in the Marianas-Carolines area from December to March. On February 22, at 17° 43' N, 139° 58' E (278 miles southeast of Parece Vela), a flock consisting of about 50 of these petrels and about two dozen unidentified (larger) shearwaters was sighted flying to and fro over one area. A petrel believed to be of this species was seen on December 16, at 10° 30' N, 157° 30' E (195 miles west-northwest of Ujelang Atoll, Marshall Islands).

*Oceanodroma* sp., STORM PETREL. The only storm-petrel noted was a white-rumped individual seen on November 8, 92 miles east-northeast of Muko Jima, Bonin Islands. Peters (1931:68-75) does not list any of the islands in the Volcano and Bonin groups or in Micronesia as breeding localities for members of the family Hydrobatidae.

*Phaethon lepturus*, WHITE-TAILED TROPIC BIRD. Off the Marianas in January, single individuals were seen twice and two birds once; three were observed with a flock of Noddy and Black-naped terns on January 27, 21 miles northwest of Pagan. One was sighted about 1000 miles east-northeast of the island of Hawaii (28° N, 139° W) on April 24, 1945.

*Phaethon rubricauda*, RED-TAILED TROPIC BIRD. Six records, August 7 to March 6, all west of 180° longitude, vary from 66 to 195 miles from nearest land. Each of these records was for a single Red-tailed Tropic Bird, although in one case two *P. lepturus* were seen simultaneously.

*Sula leucogaster*, BROWN BOOBY. A lone adult was seen flying eastward about 4:00 p. m. on February 22, 295 miles west of Anatahan, Marianas. Baker (1947:255) reported that the Gannet, *Morus bassanus*, often flew at a speed of 25 knots. If the speed of the Brown Booby approaches that of the Gannet, it appears that the individual seen would have needed to fly for a period of not less than 12 hours in order to reach land. An individual was noted 120 miles east-northeast of Maui, Hawaiian Islands, at 3:30 p. m. on March 23, 1946. Six of nine other observations of Brown Boobies made in the Mariana-Volcano islands area from August to January were within 17 miles of land.

*Sula sula*, RED-FOOTED BOOBY. Foraging flocks of 10 and 18 individuals of this species were seen 20 miles to the westward of the central Marianas on the morning of January 26. Two adults and one

bird in brown plumage were seen on January 12, 66 miles west of Guguan, Mariana Islands.

*Sula dactylatra*, BLUE-FACED BOOBY. One individual flew past the ship 200 miles southwest of French Frigate Shoals, Hawaiian Islands, (21° 08' N) late in the afternoon of March 14, 1946.

*Fregata minor*, PACIFIC MAN-O'-WAR-BIRD. Two were noted 337 miles southwest of Lisianski in the Hawaiian group on March 11. Later that day a lone female was seen gliding at a height of about 100 feet, being carried with a 15-knot wind, 333 miles southwest of Lisianski (21° 10' N). Man-o'-war-birds were not seen offshore on any other occasions.

*Sterna sumatrana*, BLACK-NAPED TERN. Terns presumably of this species were seen in the vicinity of Guam and Rota, Mariana Islands, and of Ponape, Caroline Islands, in December and January, usually within ten miles of shore.

*Sterna fuscata*. SOOTY TERN. Four were sighted shortly after sunrise on March 6, 135 miles west of Wake Island. Others were seen closer to that island, flying toward it, but they were not noted to the eastward of a point 41 miles east-southeast of Wake on March 7. Watson (1908:193) studied Sooty Terns in the Gulf of Mexico during the nesting season. He determined that they did not leave the island (Dry Tortugas) before daybreak and that they rarely traveled more than 15 miles (to the eastward of the island) during foraging periods. A possibility exists that the terns seen near Wake were migrating to the island to nest. Torrey Lyons, a botanist who spent a year on Wake Island, reported (MS) that some young of this species hatched in mid-February, 1940.

An individual, presumably of this species, was seen 162 miles south-southwest of Necker Island of the Hawaiian group about sunset on March 15. Terns, believed to be Sooties, and Brown Boobies ranged out to about 11 miles northwest of Farallon de Pajaros, Mariana Islands, on the afternoon of January 11. The terns flew from 20 to 60 feet above the surface.

*Sterna lunata*, GRAY-BACKED TERN. On March 6, when about 80 miles west-southwest of Wake, small groups of terns fitting the description of this species were distinguished from groups of Sooty Terns. Their wingbeats seemed more rapid and their flight more direct than that of the latter species. During one half-hour 77 terns were counted flying past the ship toward Wake Island, 48 of them being Sooty and 29 Gray-backed. Lyons (MS) reported this species as present on Wake Island from February until at least May 23, 1940.

*Thalasseus bergii*, CRESTED TERN. Noted within sight of the west coast of Guam on June 11 and July 10, 1945.

*Anous* sp., Noddy. Late in the afternoon of December 15, off the northwest coast of Ponape, Noddies were seen returning to the island until the ship reached a point approximately ten miles offshore. Here the Noddies were foraging at random, but they were not seen at greater distances from the island. Since specimens were not taken, species identifications of *Anous* were considered unwise.

#### LITERATURE CITED

- ALEXANDER, W. B. 1928. *Birds of the ocean*. (G. P. Putnam's Sons, New York), xxiii + 428 pp.
- BAKER, R. H. 1947. Observations on the birds of the North Atlantic. *Auk*, 64: 245-259.
- FISHER, W. K. 1903. *Birds of Laysan and the Leeward Islands, Hawaiian Group*. Bull. U. S. Fish Commission, 23:767-807.
- JESPERSON, P. 1930. Ornithological observations in the North Atlantic Ocean. *Oceanogr. Repts., Danish 'Dana'-Expeds., 1920-22*, No. 7:1-36.
- JESPERSON, P. 1933. Observations on the oceanic birds of the Pacific and adjacent waters. *Vidensk. Medd. Dansk Naturhist. Forening*, 94:187-221.
- JOUBIN, L. 1912. *La Vie dans les Océans*. (Ernst Flammarion, Paris), 332 pp.
- MATTHEWS, G. M. 1931. The nidification of two sea-birds. *Ibis*, 1931: 571-572.
- MURPHY, R. C. 1936. *Oceanic birds of South America*. (Amer. Mus. Nat. Hist., New York), xx + 1245 pp., 72 pls.
- PETERS, J. L. 1931. *Check-list of birds of the world*. (Harvard Univ. Press, Cambridge), 1:xviii + 345 pp.
- RICHARDSON, F., AND H. I. FISHER. 1950. *Birds of Moku Manu and Manana islands off Oahu, Hawaii*. *Auk*, 67:285-306.
- STARRETT, W. C., AND K. L. DIXON. 1946. The scarcity of the Black-footed Albatross in parts of its known range. *Condor*, 48:268-271.
- WATSON, J. B. 1908. The behavior of Noddy and Sooty terns. *Papers Dept. Marine Biol., Carnegie Inst. Wash.*, 2:189-255.
- WYNNE-EDWARDS, V. C. 1935. On the habits and distribution of birds on the North Atlantic. *Proc. Boston Soc. Nat. Hist.*, 40:233-346.
- Berkeley, California, and Illinois Natural History Survey, Havana, Illinois, February 1, 1951.*

## CERTAIN MOLTS AND PLUMAGES OF ACADIAN AND YELLOW-BELLIED FLYCATCHERS

BY ROBERT M. MENGEL

DIFFICULTIES in identifying certain *Empidonax* flycatchers recently led me to survey the literature concerning the molts and plumages of birds of this genus and to examine a large number of specimens. In the course of this inquiry it became evident that there has been much confusion in regard to the molts and plumages of some of the species and that the literature is often misleading or actually incorrect. In the cases of the Acadian Flycatcher, *Empidonax virescens*, and the Yellow-bellied Flycatcher, *E. flaviventris*, among others, this situation can lead to some difficulty in the allocation of specimens, and it is with these two species that this paper deals. Griscom (1923: 234) emphasized the close similarity of Acadian, Least (*E. minimus*) and Alder (*E. traillii*) flycatchers in the fall, but it seems not to have been generally recognized that any special difficulty attends the separation of any of these from the Yellow-bellied Flycatcher. Actually, during the fall a substantial proportion of *virescens* closely resembles *flaviventris* and can be most perplexing for this reason, especially to those not familiar with the genus. The possibility of misidentification is suggested by the fact that the only extant specimens of "*flaviventris*" for South Carolina, taken and recorded by the veteran ornithologist Arthur T. Wayne, were referred to *virescens* upon subsequent re-examination by Allan R. Phillips and E. B. Chamberlain (Sprunt and Chamberlain, 1949: 354). Inadequate description of the plumages of the Acadian Flycatcher is largely responsible for confusion such as this.

I first became aware of this problem when H. B. Tordoff and I attempted to identify a number of specimens we had collected near Henderson, Kentucky, in early September, 1949. We found that in a series of six specimens, which we had assumed in the field to be *flaviventris*, there were actually some individuals of *virescens*. Nowhere in the literature could we find reference to such a "*flaviventris*-like" plumage of that species. My material, supplemented by additional specimens in the University of Michigan Museum of Zoology (hereafter referred to as U. M. M. Z.), fortunately contains a nearly complete molting series of *virescens*, permitting more thorough analysis of its molts and plumages than has hitherto been possible.

I am indebted to Mr. H. B. Tordoff for help in collecting some of the material used in this study and for suggestions leading, in part, to

its inception. Thanks are due to the authorities of the University of Kansas Museum of Natural History and to Dr. George M. Sutton, for making their respective collections available to me. Dr. Ernest P. Edwards showed me two interesting specimens of his.

#### MOLTS AND PLUMAGES OF THE ACADIAN FLYCATCHER

The following is not intended to be a complete account; I shall emphasize only those plumages which appear to have been misinterpreted.

*Juvenal Plumage.*—The term "juvenal" is here used throughout as defined by Dwight (1900: 99, 106), or as the second plumage of the species, directly succeeding the natal down. This plumage does not seem to have been formally described for the Acadian Flycatcher. As will be mentioned more fully below, Dwight (1900: 146) in his description of the "juvenal plumage" was actually discussing the succeeding or "first winter plumage." The real juvenal plumage is referred to by Coues (1903: 528) who wrote, "When very young, said to be mottled transversely with pale ochraceous." Ridgway (1907: 532) under the heading of "Young" said, "Similar to adults, but feathers of the upperparts narrowly tipped with pale buffy . . ." and (footnote) ". . . the only *Empidonax* thus marked." Although it is clear that both authors were describing the true juvenal plumage, the descriptions are incomplete. In that day, moreover, the term "young" meant very little, and it is unfortunate that Ridgway did not use the more specific term "juvenal" which must by then have been available. As to the uniqueness of the buffy margins of the dorsal feathers I can not comment, except to say that juvenal-plumaged Least Flycatchers lack them.

I have examined nine specimens in juvenal, or partly juvenal, dress, two (Maryland) in the University of Kansas Museum of Natural History, and seven (Michigan, Ohio, and Indiana) in the U. M. M. Z. All of these but one are August- and September-collected specimens. They range in development from individuals with one-third-grown stub tails to fully grown birds which have commenced the molt into the succeeding plumage.

The juvenal plumage may be described briefly as follows: above, including sides of head, grayish or brownish olive, all feathers narrowly tipped with dull, ochraceous buff; tertials and secondaries edged with pale, grayish buff; greater and median coverts broadly margined with clear, chestnut buff, forming two wing-bars; rectrices and remiges dull, grayish brown or brownish olive; throat, belly, and flanks dull

white, sometimes (two of nine) faintly suffused with pale, sulphur-yellow; and band of grayish olive across chest.

The molt into first winter plumage begins about the time the tail is fully grown, new feathers appearing first on the flanks, chest, and back. The juvenal feathers tend to persist somewhat longer on the throat, belly, and crown than elsewhere. Dwight (1900: 146) was apparently correct in assuming that the flight feathers are retained at this time; at least I have found no evidence that they are molted.

*First Winter Plumage.*—This is the plumage likely to cause trouble in identification, which is not surprising, since it has apparently never been described *as such*. In view of the foregoing discussion, it is obvious that Dwight (1900: 146) was referring not to the juvenal but to the first winter plumage when he wrote, "Above, including sides of head and neck olive-green, the crown feathers darker centrally, the pileum not darker than the back. Wings and tail deep olive-brown, median and greater wing coverts edged with rich buff forming two wingbands, edgings of secondaries and tertiaries paler buff. Below, pale greenish sulphur-yellow, the chin white, a faint olive-gray pectoral band." As far as it goes, this is a good description of the first winter plumage. It should be modified, however, in two important respects: (1) The color of the entire underparts may be clear uniform lemon-yellow (or sulphur-yellow), approaching the extreme in *flaviventris* in this coloring and yellower than many of that species; (2) The throat may be suffused with pale yellow, invalidating a character that has frequently been used to separate this species from the Yellow-bellied Flycatcher. The median and greater coverts are often no buffier than those of the fresh adult winter plumage.

Three of my Kentucky specimens (males, R. M. M. Nos. 1051 and 1077; female, No. 991, September 5-9) were just completing the post-juvenal molt, and one still shows a few worn, white juvenal feathers on its belly. They are almost uniformly lemon-yellow below (except for a few veiled white feathers), and two have the throat suffused with pale yellow. Other specimens in this plumage are in the Sutton collection (male, Lake County, Florida, August 15), and in the Max Minor Peet collection at the U. M. M. Z. is a female taken at Athens, Georgia (August 28). Some of these resemble *flaviventris* to such a degree that they would be difficult to separate except with the aid of other characters to be discussed later. The postjuvenal molt as seen in the September specimens is one clue to their identity (see discussion of Yellow-bellied Flycatcher).

That this "yellow-bellied" plumage has escaped full attention in the literature is evidenced by the statements of various authors. For

example, Todd (1940: 348) stated, "In fresh fall plumage the underparts are more heavily suffused with yellowish-green, although *never so uniformly or so richly as in the Yellow-bellied Flycatcher* [italics mine]." Todd did, however, assume an early fall molt. Peterson (1947: 149) said, under Yellow-bellied Flycatcher, "Others of this group have a tinge of yellow beneath, especially in the fall, but none of the rest has uniform yellow from throat to belly." He came closer to the truth in adding, "Many Acadians look suspiciously like Yellowbellies in the fall . . . these two can not be safely distinguished [in the field] in autumnal migration." Bent (1942: 190) apparently relied mainly on Dwight's account, but ventured the ill-advised opinion that the first winter plumage is "not very different" from the juvenal.

*Postnuptial Molt.*—It has become evident that Dwight's statement (p. 146), "Young and old pass south before molting . . ." is not so in regard to the former. That this is equally untrue of adults is shown by two molting specimens from Kentucky. One (R. M. M. No. 989, singing male, Henderson, September 4) is extremely worn and faded and has just started postnuptial molt on the sides of the chest and flanks. The other (R. M. M. No. 1049, adult female, September 8) has nearly completed molting but has the central rectrices and outer remiges not quite full grown. In addition, a number of adult September specimens from Michigan (U. M. M. Z.) are in various stages of postnuptial molt. Two of these (male, No. 48846, Oakland County, August 26; male, No. 44126, Wayne County, August 30) have the outer primaries and tail so short that their powers of flight must have been seriously handicapped, an interesting situation in a fly-catching species. The body molt has almost been completed in all of them. This may be the only *Empidonax* which completes its fall molts on the breeding grounds (cf. Dickey and van Rossem, 1938: 376-382).

*Adult Winter Plumage.*—This plumage does not differ greatly from the nuptial plumage of spring birds newly arrived in the United States, although there is usually a more prominent yellow wash on flanks and lower belly, and the wing-bars may be of a richer buff. It differs from the first winter plumage just described in that the feathers of the belly are partially to entirely white. I must challenge Dwight's belief (1900: 146) that wear in the species is insignificant at all seasons. The many July birds I have examined are all somewhat frayed and faded, so that fresh plumage is instantly distinguishable from worn breeding plumage. I wish to emphasize that it is not my intention to detract from the importance and value of Dwight's classical work. By his own admission he was handicapped by inadequate *Empidonax* material, and his conclusions were tentative.

?*Prenuptial Molt*.—Dwight surmised that the nuptial plumage is acquired by wear. However, he was operating on the erroneous assumption that postnuptial and postjuvenile molts occur in winter quarters, and he may have thought of these molts as being rather late in the year. Dickey and van Rossem (1938: 378–379) have already shown that *Empidonax traillii* and *E. minimus* acquire the nuptial plumage by a molt, rather than by wear as Dwight supposed. Moore (1940: 352) mentioned a Honduras specimen of *virescens* (female, Cofradia, March 11) with “freshly molted wings and tail.” It seems probable to me that a prenuptial molt, partial or complete, occurs in early spring as in related forms. Spring birds newly arrived in the United States are in uniformly sleek, fresh-looking plumage. In fact, they are very similar to freshly-molted fall adults, as I have already mentioned. Chapman (1917: 473) remarked that, “December specimens are much yellower below than those taken in February and March [Colombia].” However, I have noted considerable variation in the amount and brightness of ventral yellow in spring specimens. It is impossible to say whether the amount of this yellow is correlated with age, as it is in the fall; I have seen no spring birds approaching fall immatures in yellowness of underparts. The occurrence of a prenuptial molt remains to be conclusively demonstrated.

#### MOLTS OF THE YELLOW-BELLIED FLYCATCHER

Dickey and van Rossem (1938: 376), through examination of many winter specimens from El Salvador, were able to shed much light on the previously little-known molts of this species. Briefly stated, they agreed with Dwight (1900: 145) that the postjuvenile molt is not completed until late in the fall, after migration, and does not involve the flight feathers. They stated that, contrary to Dwight's belief, a prenuptial molt (said to be complete in young birds) occurs in spring, and that adults complete the postnuptial body molt at various times during the fall. A slow primary molt of adults, begun with the conclusion of the body molt, takes up the better part of the winter. They cited specimens in various stages of primary molt, taken from December 1 to March 25. Adults then undergo a spring molt of the entire body plumage in March and April. They did not say how they distinguished young from adults in late winter and spring.

The only one of nine early fall *flaviventris* I have handled in the flesh (eight from Kentucky, one from Ohio) which was molting is R. M. No. 1073, an adult female (skull completely ossified), from Henderson, Kentucky, September 8, 1949. This bird is so intermediate in its various characters that I have never been absolutely

certain as to its species, but I have tentatively identified it as *flaviventris* (see "identification," following). It still bears a sheath about seven millimeters long at the base of each outer primary, indicating that all the primaries (since the outermost are typically the last molted) have been recently replaced.

Of interest also are two specimens collected by the recent Lea-Edwards expedition in Chiapas, Mexico. In one (E. P. Edwards No. 1222, adult male, August 15, 1950) all the rectrices are fresh and new except the central pair which is markedly worn and faded. The other (R. B. Lea No. 890, same sex and date) has the entire tail fresh, but the central rectrices are only two-thirds grown. These specimens appear to be in successive stages of a complete tail molt. The specimens described suggest that the molt of adult flight feathers may be even more erratic and protracted than Dickey and Van Rossem suspected.

Additional evidence of spring (prenuptial) molt is provided by four March and April specimens from Chiapas (U. M. M. Z.) which are definitely worn above and on the wings and tail, and fresh and bright yellow below. No. 102626, male, April 21, 1939, lacks the tertials (often lost in preparation when these feathers are molting) and has the entire crown in molt. Aldrich and Bole (1937: 104) recorded a specimen from Panama (male, March 25, 1932) with the wings and head in molt.

Some doubt remains in my mind in connection with the fall molts of the species. Carefully annotated late summer specimens from the breeding grounds are desirable; many fall migrants are in such fresh appearing plumage it is difficult to believe that they have not recently completed a molt, especially since unmolted Acadians of corresponding date are visibly worn. It must be remembered that *flaviventris*, breeding as it does in coniferous forest areas, might be expected to become more worn than *virescens* during the summer, due to contact with this abrasive foliage.

#### IDENTIFICATION OF SPECIMENS

A review of the characters useful in separating the two species is in order.

*Primary Formula.*—The relationship in length of the tenth (outermost) primary to the fifth has been much used as a key character in this genus (*cf.* Ridgway, 1907: 546). However, as Moore (1940: 350) has pointed out, some of the species are extremely variable in this respect. This is true of the present forms. A little-publicized distinction between *virescens* and *flaviventris* is that of Coues (1903: 528,

530) who gave the first (= tenth; Coues numbered from the outside in) primary as equal to the fifth (= sixth) in the Acadian Flycatcher, and equal to the sixth (= fifth) in the Yellow-bellied. Thus, numbering conventionally,  $10 = 6$  in *virescens*,  $10 = 5$  in *flaviventris* (Fig. 1). In testing this system I found that of 118 *flaviventris* examined, 31 were intermediate toward the condition alleged for *virescens* and 10

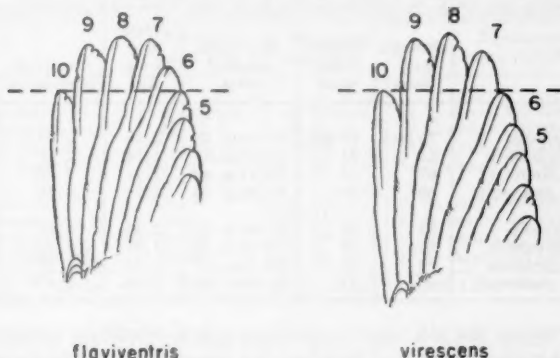


FIGURE 1. "Typical" wingtips of Yellow-bellied and Acadian flycatchers, showing the ideal relationships of the outermost primary as pointed out by Coues. Note the more rounded profile in *flaviventris*.

actually possessed the formula attributed to *virescens*. In a series of 89 Acadians, 16 were intermediates and three had the formula given for *flaviventris*. The intermediates, being neither here nor there, must be classed as "bad." Therefore, the formula breaks down in 34 per cent of the Yellow-bellies and 21 per cent of the Acadians in these series. Further, it is useless in the event of a wing molt, or if the primaries are broken. The primary formula can serve as a suggestive, but not as a definitive, character. It should be mentioned that the shape of the wingtip, as shown in the figure, is useful as a clue to identity, even when the relative length of the outer primary varies. The wing tends to be more rounded in *flaviventris*. Moore (1940: 350) claimed that, in western forms with variable length of the outer primary, especially in *difficilis*, this feather tends toward shortness in the more southern populations. This may be true of *virescens* also, as more of the intermediates and all in my series with the *flaviventris* type of wingtip, are from Texas, Louisiana, and other southern states.

*Size*.—The Yellow-bellied Flycatcher averages smaller than the Acadian, but there is a considerable size overlap. Males average

larger than females in each species, male *flaviventris* approaching, but not quite equalling, female *virescens*. Since the overlap between the species thus varies considerably, depending on which sex is being compared with which, it follows that *correct sexing is of the utmost importance in making identifications.*

TABLE 1  
STATISTICS OF LENGTH OF WING AND TAIL

	Observed mini- mum	Observed maxi- mum	Mean with standard error	Stand- ard devia- tion	Coefficient of variation	Size of sample
Wing						
Male <i>virescens</i>	70 mm.	79 mm.	74.62±.28	2.08	2.79	55
<i>flaviventris</i>	62	71	67.64±.21	1.74	2.57	70
Female <i>virescens</i>	67	74	70.17±.40	1.91	2.72	23
<i>flaviventris</i>	60	70	64.29±.40	2.24	3.48	31
TAIL						
Male <i>virescens</i>	53	62	57.46±.30	2.23	3.87	54
<i>flaviventris</i>	48	55	50.88±.18	1.49	2.92	68
Female <i>virescens</i>	52	57	54.14±.27	1.25	2.30	22
<i>flaviventris</i>	46	53	49.00±.33	1.80	3.67	29

In *virescens* the bill tends to be longer and relatively narrower, the tarsus slightly longer and heavier, the wingtip relatively longer, and the feet larger than in *flaviventris*, but since there is much overlap in these features, and they are difficult of accurate measurement, they will not be considered in detail here. The wing and tail of *virescens* average larger, being the longest of any eastern *Empidonax*. For measurements which suggest the size differences see Ridgway (1907: 550, 553). His measurements were based on small series (5 to 24 specimens) and simply show the ranges observed in limited samples; in short, they are not very reliable in separating questionable individuals. Statistical treatment of my own measurements leads me to believe that Ridgway measured some mis-sexed birds (for example, his maximum tail measurement of 61 mm. for female *virescens* is incredibly large).

With the intention of establishing more useful ranges as an aid to identification, I have undertaken a statistical analysis of the variation in length of wing and tail in the species under consideration (Table 1).

The specimens measured were all birds of undoubted identity with primaries and rectrices unworn. Measurements of wing (chord) and tail were taken as recommended by Baldwin, Oberholser, and Worley (1931: 76, 92-93) and to the nearest millimeter. The principal difficulty encountered was that of eliminating incorrectly sexed birds from the sample. Since my choice of these was unavoidably sub-

jective, I attempted to compensate by discarding all the specimens taken by collectors any of whose sex determinations were questioned. As far as possible I relied on material taken by experienced collectors. Despite these precautions it is probable that some error in sexing remains in one or more of the series. Troubles of this sort will con-

TABLE 2  
THEORETICAL EXTREMES ( $M \pm 3\sigma$ ) IN LENGTH OF WING AND TAIL

	Theoretical minimum	Theoretical maximum	Theoretical separability*
WING			
Male <i>virescens</i>	68.38 mm.	80.86 mm.	78 % should fall above 72.86
<i>flaviventris</i>	62.42	72.86	65 % should fall below 68.38
Female <i>virescens</i>	64.40	75.90	33 % should fall above 71.01
<i>flaviventris</i>	57.57	71.01	52 % should fall below 64.40
TAIL			
Male <i>virescens</i>	50.77	64.15	82 % should fall above 55.35
<i>flaviventris</i>	46.41	55.35	47 % should fall below 50.77
Female <i>virescens</i>	50.39	57.89	41 % should fall above 54.40
<i>flaviventris</i>	43.60	54.40	77 % should fall below 50.39

\*Per cent of Acadians which should be larger than largest expected Yellow-belly. Per cent of Yellow-bellies which should be smaller than smallest expected Acadian.

tinue until a majority of collectors adopt the commendable habit of indicating on labels, by drawings or otherwise, that gonads have actually been seen.

Those unfamiliar with statistical methods may refer to Table 2, which shows the theoretical upper and lower extremes of wing and tail lengths to be expected (Mean  $\pm$  three standard deviations) on the basis of the samples analyzed. It shows also the percentage of each sex of the larger species which should fall above the theoretical maximum of the corresponding sex of the smaller in a given measurement, and *vice versa*. The percentages are based on the theoretical distribution of individuals within a normal population curve. Amadon (1949: 251-256) presented an excellent discussion of the characteristics of the normal curve as applied to ornithological work.

The table will be of some help as an aid in identifying specimens whose other characters cause difficulty, so long as it is kept in mind that statistics prove nothing, but indicate probabilities. At least the table is more conservative (less separation) than any system based on observed ranges alone is likely to be. Those desiring still greater assurance of accuracy may wish to make some allowance for the standard errors of the means, or to compute "standard ranges" ( $M \pm 3.24\sigma$ ) as proposed by Simpson (1941).

*Other Characters.*—In addition to the foregoing, in *flaviventris* the yellow underparts are often more heavily suffused with dull olive than

in immature *virescens*, and the dorsal color seems to average slightly deeper olive. It is difficult to understand how the popular notion got started that the Acadian is the "greenest of the *Empidonax*es."

It is quite possible that certain specimens may never be identified with absolute confidence. Indicative of this is R. M. M. No. 1073, mentioned earlier in connection with the molts of the Yellow-bellied Flycatcher. The bird is a female (ovary clearly visible upon dissection) with the wing measuring 71 (near the maximum expected for female *flaviventris*). The tail is 54 mm. in length (large), the primary formula is intermediate, the bill medium-sized, and the plumage characters are possible for either species. The fact that the skull was completely ossified, indicating an adult, tips the balance in favor of *flaviventris*. Were it not for this the specimen would be essentially unidentifiable. Hence, correct aging of "yellow-bellied" flycatchers in early fall is very important.

#### SUMMARY

The molts and plumages of the Acadian Flycatcher have been poorly understood and have been misinterpreted in some details. The juvenal plumage is olive above, with buffy feather margins, and white below. Contrary to some previous statements in literature, a post-juvenal body molt takes place before the birds leave the breeding range. The first winter plumage, which has not heretofore been described as such, is yellower below than any other plumage of the species, equalling or exceeding some Yellow-bellied Flycatchers in this respect. The adults undergo a complete postnuptial molt before leaving the breeding range. The Acadian may be the only *Empidonax* of the United States, which has its fall molts before migration. A pre-nuptial molt may occur in the winter range, but this remains to be demonstrated.

Although the molts of the Yellow-bellied Flycatcher have been described previously in some detail, there are still points in need of clarification, particularly in regard to the fall molts. Some additional evidence of two molts per year, spring and fall, is presented.

Separation of "yellow-bellied" immature *virescens* from *flaviventris* in fall can be very difficult, though large Acadians are readily separable from small Yellow-bellies. A previously proposed primary formula is rather unreliable for separating the species. Extreme care in sexing and aging of specimens is important, and careful notes should be recorded on any molting specimens of *Empidonax*.

LITERATURE CITED

- ALDRICH, JOHN W., AND BENJAMIN P. BOLT, JR. 1937. The birds and mammals of the western slope of the Azuero Peninsula [Republic of Panama]. *Sci. Publ. Cleveland Mus. Nat. Hist.*, 7: 1-196.
- AMADON, DEAN. 1949. The seventy-five per cent rule for subspecies. *Condor*, 51: 250-258.
- BALDWIN, S. PRENTISS, HARRY C. OBERHOLSER, AND LEONARD G. WORLEY. 1931. Measurements of birds. *Sci. Publ. Cleveland Mus. Nat. Hist.*, 2: 1-165.
- BENT, ARTHUR CLEVELAND. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. *U. S. Natl. Mus. Bull.* 179: 1-555.
- CHAPMAN, FRANK M. 1917. The distribution of bird-life in Colombia. *Bull. Amer. Mus. Nat. Hist.*, 36: 1-729.
- COUES, ELLIOTT. 1903. Key to North American birds (5th Ed.). (Dana Estes & Co., Boston), Vol. 1: 1-535.
- DICKEY, DONALD R., AND A. J. VAN ROSSEM. 1938. The birds of El Salvador. *Field Mus. Nat. Hist., Zool. Ser.*, 23: 1-609.
- DWIGHT, JONATHAN, JR. 1900. The sequence of the plumages and moults of the passerine birds of New York. *Annals N. Y. Acad. Sci.*, 13: 73-360.
- GRISCOM, LUDLOW. 1923. Birds of the New York City region. *Amer. Mus. Nat. Hist. Handbook Ser. No. 9*: 1-400.
- MOORE, ROBERT T. 1940. Notes on Middle American *Empidonaces*. *Auk*, 57: 349-389.
- PETERSON, ROGER T. 1947. A field guide to the birds (2nd Revised and Enlarged Ed.). (Houghton Mifflin Co., Boston), pp. 1-290.
- RIDGWAY, ROBERT. 1907. The birds of North and Middle America. *U. S. Natl. Mus. Bull.* 50 (part 4): 1-973.
- SIMPSON, G. G. 1941. Range as a zoological character. *Amer. Journ. Sci.*, 239: 785-804.
- SPRUNT, ALEXANDER, JR., AND BURNHAM E. CHAMBERLAIN. 1949. South Carolina bird life. (Univ. S. C. Press, Columbia, S. C.), pp. 1-585.
- TODD, W. E. CLYDE. 1940. Birds of western Pennsylvania. (Univ. Pittsburgh Press, Pittsburgh), pp. 1-710.
- University of Michigan Museum of Zoology, Ann Arbor, Michigan, March 16, 1951.*

## HATCHING OF EGGS OF HAND-REARED WOOD THRUSHES

BY H. ROY IVOR

INCUBATION of the eggs and brooding of the young is, among many species of songbirds, the duty of the female. Whether the male knows when the young have hatched, by seeing them in the nest or knows in some other way, has been a controversial subject among many who study birds. The following record of the hatching of the young of a pair of Wood Thrushes, *Hylocichla mustelina*, may throw further light on the question.

The birds I keep for study are enclosed during the winter in a heated songbird observatory. This building, facing south, is 44 feet long—14 feet of this length being a storeroom—10 feet wide and 8 feet high. Almost the entire south wall is made up of windows with removable, double sash. In the spring these windows are taken out and the birds have access to a flight cage of almost the same size as the observatory. This flight space is connected to the breeding observatory, some 60 feet to the southeast, by a flyway made of half-inch mesh screen wire. This observatory is octagonal, 25 feet in diameter, and 10 feet high at the center. Eight large breeding compartments are arranged around the center flight area which is reserved for unmated birds. Arbor vitae and spruce form most of the planted shrubbery used for roosting and nesting sites. (See Ivor, Wilson Bull., 56:91-104, 1944, for further details).

When a nest is built and the first egg laid, a small gate over a platform is opened in the compartment so that the pair may seek food for the nestlings outside the observatory. Until the eggs have hatched the birds are closed in each evening. So that the parents may feed them natural food, as soon as the first nestling has hatched, the gate is left open at all times until the nestlings become independent.

The reason for giving liberty to the nesting pair as soon as the first egg is laid is that if the female does not readily find her way back through the small exit gate, the chilling of the first egg will not prevent hatching, whereas severe chilling of eggs after incubation has begun might do so. For various reasons I did not follow this procedure with this pair of thrushes but, instead, opened their gate late in the morning of the day I expected the first egg to hatch.

In this record I shall identify these two mated thrushes by naming the male "Vor" and the female "Vee."

At 10 a.m. on June 15, 1948, I opened the gate of exit and entrance. Five minutes later Vor learned it was open. After 20 minutes of in-

tensive searching for grubs he returned. Although he had had great difficulty in locating the entrance when first given liberty the year before, he found his way in at once. Only once during the next two and a half hours did he leave his compartment and return.

At 12 p.m. I went to their compartment and, later, minute by minute, entered in a notebook every move made by each—when Vee turned the eggs, pecked at the tiny, widening openings in the shells, or merely looked at the eggs, or when she left the nest to eat or drink or bathe.

#### THE RECORD

12:25 p.m.—Vee leaves the nest and as I stand close by, I can see a pin-point hole in one egg. Vor flies to rim of nest and looks at eggs, as often he had done before. Vee returns to nest after being off for a little less than a minute.

12:40—Vee is still on nest and Vor on branch two feet away. Vee stands up in nest and pecks gently at what must be the tiny hole which at present I cannot see. She utters a low note as she settles on her eggs, apparently calling Vor to the nest. He hops to the rim and I hear low notes uttered by each. Vor's bill is full of saliva which he appears to want to give to the nestlings which have not yet hatched. Vee refuses to rise and Vor gives her some of the saliva. She then rises high enough to allow him to look at the eggs. While he is watching she pecks at one which shows a hole about an eighth of an inch in size. She seems to be pecking gently at either the shell or the lining. It may be that before she called Vor she had felt the moving beak of the unhatched chick through the small hole and had called her mate at that moment. Vor shows evidence of excitement by continually erecting the feathers of his crown. This behavior seems to indicate that he is aware of the beginning of hatching.

1:43—Vee leaves nest to feed and to drink. Now I see a hole in a second egg nearly the same size as in the first egg.

1:44—Vee returns to nest, looks at eggs, but does not touch them.

1:51—Vee rises slightly and pecks at the eggs twice within the next minute.

1:56—Again Vee stands in nest and twice more picks at the two eggs showing holes. Although she "trusts" me well—not so well as does Vor—I have to stand very still or she will at once cover her eggs with her breast. All this time Vor has been singing, mostly in a low voice, but he has not left the compartment since 12:25 p. m.

2:01—Vee looks at her eggs, then pecks at the shells.

2:09—Vee rises, preens her feathers, then touches and perhaps turns her eggs.

2:12—She rises and touches the eggs with her bill.

2:15—She rises and merely looks at the eggs.

2:17—She leaves her nest. I can see the tiny bill of one nestling showing through the hole which does not seem much larger. Vor stands on the edge of the nest while Vee leaves to feed.

2:19—Vor leaves the rim of the nest while Vee bathes.

2:21—Vor flies to rim of nest while Vee is drying her feathers.

2:25—Vee leaves her nest to bathe again.

2:27—Vee flies to rim of nest, looks at the eggs, and then covers them. She must still be damp after her bath.

2:29—She rises, looks at the eggs, and just touches them.

2:30-2:55—I am unable to be present.

2:56—Vee leaves nest. I cannot see the holes in either egg; she must have turned them while I was away.

2:59—Vee stands on edge of nest for one minute, intently watching the eggs but not touching them. After the minute she covers the eggs.

3:00-3:05—I am not present.

3:07—As I approach to within two feet I can see Vee apparently pecking at the eggs, but cannot see clearly what she is doing.

3:10—Again Vee rises and examines the eggs. I am now better able to observe her actions. So far she has always crouched on her nest when I go close enough—18 inches—to allow of intimate examination, but this time she allows me to watch. She is picking tiny bits of shell lining from around the holes and eating these pieces. The holes do not appear much larger.

3:20—Irrregularly, at intervals of from one to two minutes, she repeats the above performance except during eight minutes when I apparently stand too close to suit her. During this time she will not rise. After eight minutes have passed, I move a little farther away, yet am still close. Then until 3:55 she pecks at the shell and lining every 10 to 20 seconds. Apparently the shell is breaking all the way around, although I am not close enough to be certain.

3:55—Vee leaves her nest. I can see that one nestling is entirely out of the shell. The other is still in the shell which has separated all the way around except for about a quarter of an inch. This nestling is moving almost continually and can readily be seen through the break in the shell. The first nestling is naked except for tiny tufts of down which look more like hair than down. At times, it weakly throws itself around in the nest. Vee is hopping around the compartment, occasionally helping herself to food. Vor does not go to the nest but runs and flies around the compartment, excited, with crown feathers raised.

3:59—Vee flies to nest and covers eggs and nestlings.

4:15—Vee leaves nest. Second nestling is clear of shell. Vee now takes the shells from the nest. Vor finds a soft-bodied worm in the compartment, which he masticates with his bill. Then he flies to the rim of the nest, and, after considerable coaxing to make the nestling gape, feeds it to one young. This is the first time Vor has seen the nestlings, yet it seems obvious that he knew they were out of the shell and ready for food. At 3:05 only a very small hole was evident in each egg. Now, as I look into the nest, Vor appears greatly excited and gives me plainly to understand, or so it seems to me, that I must not go too close to his nestlings. So far as I can determine, the chicks hatched 20 hours after the first pin-point hole showed in the shell, for I feel sure I could see such a pin-point about eight o'clock in the evening of June 14.

4:32—Vee leaves her nest and finds the open gate through which she goes to seek food for the newly-hatched young ones. While she is out, Vor stays for the most part on the rim of the nest. The minutes pass. This is the test and an anxious time. Twenty minutes have passed and Vee is flying around the observatory trying to locate the entrance, and without success. I touch the eggs and find they are becoming cold. I take them out of the nest and place them under Sherr, the male Rose-breasted Grosbeak, *Phœticus ludovicianus*, who is taking his turn on his nest. I return and take the two nestlings to hold and warm in my hand. Vor is very much concerned when I put my hand into the nest. He murmurs low notes and gently touches my fingers as I hold his nestlings. Evidently he is very "anxious," as he is singing, apparently using this song to call Vee to her nest. She responds by flying excitedly around and around the observatory which is 90 feet in circumference, still unable to find her way in.

5:05—Just as Vee is opposite the gate Vor flies in front of it and she sees the entrance, runs through, and flies up to the nest while I am placing the nestlings there. She looks at them for a moment, then settles down on the nest. Four minutes later Vor leaves the compartment and in less than two minutes returns with a bill full of tiny insects. Both parents then coax with throaty notes, seemingly trying to induce the infants to open their bills. The little ones seem very weak and it is taking a great deal of coaxing to get them to gape. At last the parents succeed and the nestlings are fed. Only three times more this day does Vor leave the compartment to seek food for the young, and each time it is necessary for him and Vee to coax for a considerable length of time before they respond. Many authorities assert that feeding reactions in the parents are incited by the gaping of the young. Here is definite proof that this is an error, at least so far as the Wood Thrush is concerned, and I have found the same reactions among other songbirds. Now I take one of Vee's eggs from the grosbeaks—leaving the other with them as it has become evident that their own eggs are not now going to hatch—and place it under Vee.

6:15 a. m., June 16—This morning, although the temperature is not low, the sky is heavily clouded; there is a rather dense fog and a chilly breeze from the southwest. Vee is sitting on the nest, Vor outside seeking food. Three times during the next hour and three-quarters he brings food for the nestlings, but Vee does not leave the compartment.

9:18—I can see that Vee's third egg has a hole in the shell about three-eighths of an inch in diameter, and I can also see the bill of the nestling.

9:25—I gently raise the female Rose-breasted Grosbeak sufficiently to see that Vee's fourth egg is hatching. I can see the bill of this nestling.

1:55 p. m.—Vee's third nestling is out of the shell.

4:00—Vee's fourth nestling, under the grosbeak, has hatched. Part of the shell is sticking to the down on top of its head. The female grosbeak is exceedingly careful in removing this shell. She pulls it a little, then lets it drop, then pulls it a little again. Seven exceedingly gentle pulls and it comes off. She seems to know that the shell should not be pulled off with a jerk. The pair of grosbeaks, both of which have been hunting food in the trees, is trying to feed the newly-hatched nestling, but not with much success. Their feeding methods are much different from those of the Wood Thrush; they are so careful that the swallowing muscles are grasping the food; they give and withdraw it so often that the little thrush is too tired to gape further and thus remains unfed. Both try again and again to feed it, but without success; so, at 7 p. m. I take it from them and return it to its mother.

June 17 is cloudy, damp, and chilly. Heavy rain falls all morning. When I enter the Wood Thrush compartment and look into the nest, all four nestlings appear dead. Vee must have gone out very early and been unable to find her way in. I take them to the house and revive the three oldest by placing them in a nest in the oven. When they seem fully warmed I place them in their nest, as Vee has found her way in. Apparently she had been in for some time while I was warming the nestlings, but, finding none in the nest, she will now neither feed them nor brood them. Vor flies to the nest with food and tries, with much coaxing, to feed them. They are seemingly too weak to open their bills for the food he has brought. Several times, as I find they are chilled, I take them to the house to be warmed; and three times, when I put them back in the nest, Vor tries to feed them—each time without any success. For the fourth time I have placed them in the nest, but now neither Vee nor Vor offers to feed them, although both go often and look in. Both are much excited and worried, carrying food in their bills, and running around on the

ground as though hunting their nestlings there. There seems one thing only to do—take the young thrushes into the house and try to rear them myself, an almost impossible job. I gather soft-bodied caterpillars and place these deep in their throats and they swallow, but nestlings so young seem to need the parent's saliva as well. Before evening has ended all three are dead.

Neither Vee nor Vor left the compartment again that day. Each kept hunting all over the ground, flying often to the nest to look in. For eight days each carried food in its bill, visiting the nest in the seeming expectation of feeding nestlings that still should be there. Usually when the nestlings in a nest are destroyed, birds build again. Vee did not attempt to build again so I closed the pair in for that year.

#### SUMMARY

In an attempt to determine how a particular male of one species of passerine bird knew when the young had hatched, a pair of observatory-conditioned Wood Thrushes was used in the experiment and a fairly continuous watch of the activities of the female was kept from the time the first pin-point hole appeared in one egg until the nestlings had hatched.

It was found that from the time the first pin-hole appeared until the chick was out of the shell, the female's activities consisted of rising to look at the eggs, pecking at the hole, touching the eggs with her bill, seeking food from a food dish, and bathing.

The time elapsing between each of these activities varied, with few exceptions, from ten seconds to eight minutes. The time elapsing between the first puncture of the shell by the beak of the unhatched nestling and its emergence from the shell was approximately 20 hours, so far as could be determined.

I am certain the male Wood Thrush did not see the nestlings hatch nor see the female feeding them, yet he gave evidence of knowing they had hatched.

The nesting rhythm may, under certain circumstances, be so upset that the nestlings will die of exposure and starvation. The feeding reactions persisted for eight days after the young died.

*Erindale, Ontario, Canada, March 8, 1951.*

## HAZARDOUS NESTING OF THE CHIMNEY SWIFT

BY RALPH W. DEXTER

IN the study of nesting Chimney Swifts, *Chaetura pelagica* L., which occupy the air shafts of three adjacent buildings on the Kent State University campus at Kent, Ohio, observations were made on one bird and its mates which persistently nested in a hazardous situation. In spite of the fact that the nest was placed so near the top of the shaft that it was washed off by heavy rain before nesting was completed, the birds continued to build the nest in the same precarious position for four consecutive years. Each year the same accident was repeated. The life history of the male (No. 42-188516) and its mates just preceding and during those four years will be traced. The method of study and the life history of several other individuals have already been published (Dexter—Audubon Mag., 52:158-161, 1950; Bird-Banding, 21:99-104, 1950; Ohio Journ. Sci., 51:42-46, 1951; Amer. Midl. Nat., 46:227-229, 1951).

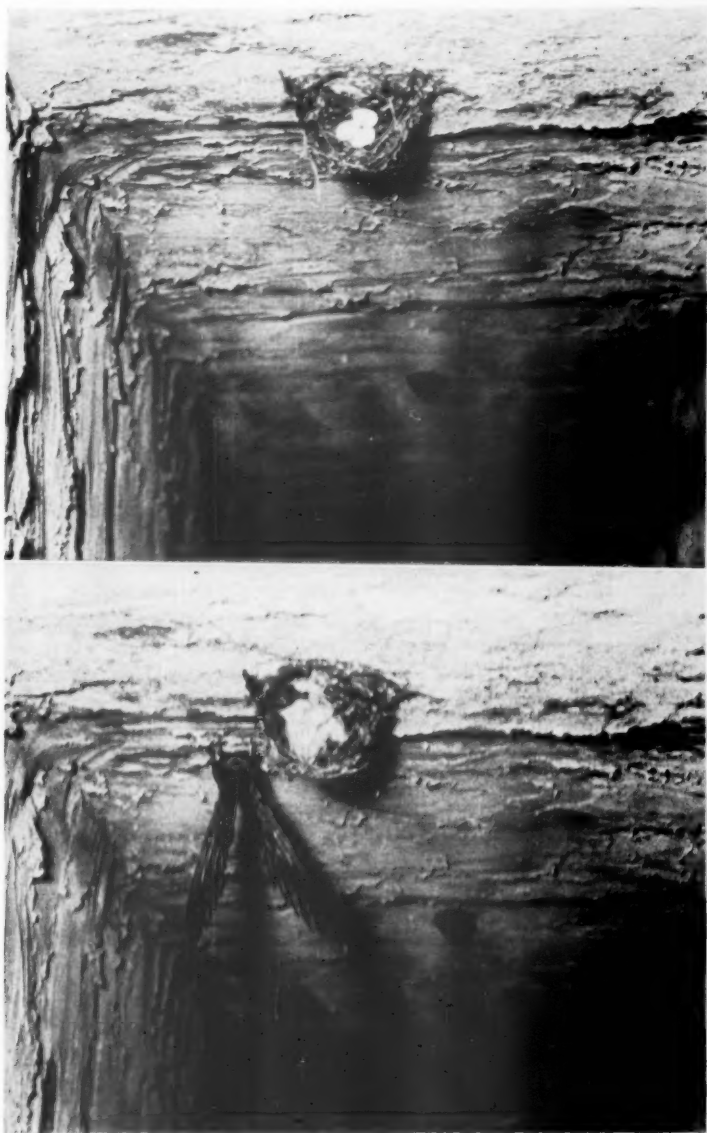
Swift No. 42-188516, which will be referred to as No. 16, was banded on June 5, 1947, in air shaft B1. At that time it was trapped with another bird which was banded No. 42-188515. Although these two roosted side by side each night for nearly three weeks, they failed to construct a nest. In the evening of June 30 only a single individual spent the night in B1. Two nights later there were again two birds roosting there, but on different walls, and they proved to be No. 15 with another swift, No. 42-188524. After that date the swifts abandoned that shaft. No. 16 was not found again during the season. In September after the nesting season; No. 15 was retrapped on two different occasions with a small group of Chimney Swifts in shaft N9.

No. 16 returned to B1 on May 9, 1948, at which time he was alone. After May 17 two birds were roosting there; four days later Nos. 15 and 16 were again trapped together from this shaft. However, they soon separated and were never found together again. No. 15 was found alone in shaft L3 on May 31. The next night it was in the adjoining shaft L2 with swift No. 42-188518, but once more dropped out of sight until after the end of the nesting season when it was for a second year found with a group of swifts in shaft N9. A foot injury to this bird (the band had slipped down over the toes, causing them to coalesce with a loss of the nails) may have interfered with normal nesting. The band was transferred to the opposite leg when the injury was discovered upon her return in 1948. This is the only case of such injury observed in banding more than 500 swifts. Possibly the

hind toe was caught under the band when it was placed on the leg, allowing it to slip over the front toes.

No. 16 remained alone in B1 for three days, and then another bird, No. 42-196907 which had nested or resided in shaft D4 for at least four consecutive years (for three of those years there were always three birds together) joined him on various nights. Sometimes they roosted side by side and sometimes on adjacent walls. On June 6 they began the construction of a nest. Most of the swifts breeding on the campus that season already had their nests made and several had already laid some of the eggs. What appeared to be copulation was observed one evening three days later while these birds were roosting on the nest foundation. Usually a swift's nest is completed within three to six days, but for some reason progress in this nest was suspended for seven days. It was finally completed by June 17. On several occasions one member of the pair was seen at the nest with a twig in its mouth, which was ready to be applied in the construction. This nest was placed only six feet from the top of the shaft. (The range in depth, from top of shaft, for this colony over a period of five years was from 6 to 53 feet. The average distance of 85 nests was 20.8 feet.) The first egg was laid on June 22. Two were found on June 25, and three the following day. Usually one bird incubated the eggs while the other roosted below the nest during the night. Throughout the day one or the other was always warming the eggs. On July 12 a heavy rain storm washed the nest with its three eggs off the wall. Soon the parents scattered into different flocks which form after nesting is completed; although both returned for nesting during the ensuing three years, these two did not mate with each other again.

No. 16 returned to shaft B1 on May 10, 1949. He was observed at that time in copulation with a swift which escaped from the trap and hence was not identified. However, the pair continued to occupy the same shaft and eight days later a retrapping demonstrated that No. 16 was mated to female No. 42-188550. While this bird had been in the colony the preceding year she had not been known to nest on the campus. When first discovered in 1948 she was roosting alone while other swifts were nesting. After breeding was completed she roosted with various small groups of swifts. Upon her return in 1949, however, she immediately became the mate of No. 16, remaining so for two years. As in the previous year, No. 16 and his mate were slow in preparing the nest. On several occasions the two were not side by side while roosting at night, and at least on one occasion one bird spent the night alone in B1. However, on June 8 when most of the Chimney Swifts had already laid several eggs, this pair began to build



(Upper) NEST WITH THREE EGGS IN AIR SHAFT B1 ON THE ROOF OF KENT HALL. INCUBATING PARENT ROOSTED BELOW NEST WHEN DISTURBED. PHOTOGRAPH BY ROBERT VATILLA, 1950. (Lower) NESTLINGS IN SHAFT B1 WITH PARENTS, A FEW DAYS BEFORE NEST FELL FROM WALL. ONE PARENT WAS ON NEST AND ONE BESIDE IT BEFORE THEY WERE DISTURBED. PHOTOGRAPH BY ROBERT VATILLA, 1950.



the nest. Three other pairs also began nest construction about this same time. No. 16 and his mate were very slow in bringing the nest to completion, requiring 16 days in all. The nest was placed close to the same spot (6.6 feet down in the shaft on the north wall) where the previous one had been attached. The first egg was observed on June 29. Two days later the second one appeared and after three more days the third and last egg was observed. The newly-hatched nestlings were seen for the first time on July 22. Two days later their blue pin feathers were beginning to grow. On July 30 just as the feathers had opened out, a heavy rain for the second year loosened the nest and it crashed 28 feet to the bottom of the shaft. Two of the nestlings survived. They were found resting on top of the fallen nest where the parent birds continued to feed and care for them. One night a few days later four juvenile swifts from another family roosted with the parents in this shaft. In a week's time the fallen nestlings began clinging to the wall near the bottom. Gradually they climbed higher up on the wall. On August 11 they had reached to within a few feet of the top. The family now roosted in a compact group at night. After nine days one of the juveniles left the shaft on its first flight. The next day both were gone. That evening three juvenile swifts roosted in B1 with the parents, and were banded the following morning. It is not known, however, whether or not these included either of their own offspring. All of these birds then left and were not seen again during the season. Only the parent birds later returned.

The parents returned together to shaft B1 on May 8, 1950. (Two days earlier a pair had been seen in this shaft for the first time that spring, but the pair was not trapped at that time.) This pair, for the second consecutive year (third time for the male) showed signs of hesitation in mating. Again they were slow in completing the nest, and placed it in the same precarious position. This year the nest was begun on May 27 and completed 13 days later. Egg laying began after June 12. Three eggs were laid by June 18. Two hatched on July 7 (Plate 7). The third never hatched. Ten days after the two hatched, and just as they had feathered out, a rain storm for the third time soaked the nest away from the wall. The next day the two nestlings were found clinging to the bottom of the shaft while one of the adults was near by. The nestlings remained hanging on the wall side by side for a week, during which time the parents continued to feed and care for them as they had done the previous year for another brood. As the young birds gained strength they gradually made their way to the top of the shaft. One night a visitor, No. 48-164546, spent the evening roosting with the family. By August 5 the juveniles had learned

to fly and were not seen again. The parents continued to roost in B1 from time to time, but did not remain together constantly. No. 16, for example, was found roosting in the evening of September 23 in shaft G4 with one of the birds (42-196941) that nested there and the swift that had visited in B1 earlier (48-164546). On September 20, however, No. 16 and his mate returned to their nesting shaft.

Upon their return in 1951, these birds were no longer mates. The female went to shaft M7 and joined the male (42-188540) which had nested there during the two previous years. Neither of his former mates returned. No. 16 returned for the fourth season to shaft B1 on May 7, 1951. At that time he was with the visitor of the past year (48-164546) and an unbanded bird. Five days later Nos. 16 and 46 were hosts to 66 migrating Chimney Swifts, which roosted with them in B1 for the night. None had previously been banded and none remained in the campus colony. A few nights later the occupants of B1 left to roost in shaft C3, but apparently returned to B1 for two more nights before these two birds separated. On May 28 the female was found alone in shaft G3. Five nights later she roosted alone in B1. Very soon, however, she joined a male, 42-188526, in shaft Q2 on the roof of the adjoining building where they nested for that season, constructing their nest 53.2 feet down from the top. This male had nested or resided in this shaft for the previous four years. No. 16 then joined female No. 42-196904 in shaft E6 where they nested 8.1 feet down from the top. The new mate of No. 16 had previously nested there for five years and in shaft A1 in 1944 and 1945. (The life history of No. 4 during the first six years of this study has already been published (Dexter, *Bird-Banding*, 21:99-104, 1950). This bird died, apparently from natural causes, on August 6, 1951). This was the first time, however, that she had nested as near the top of the shaft as No. 16 always has. But this time, nesting was successful in this precarious position, although by a narrow margin, for soon after the nestlings left the nest it fell from the wall as in past years.

#### SUMMARY

A male Chimney Swift nested for four consecutive years in air shafts of Kent Hall on the campus of Kent State University so near the top that the nest was washed off the wall by rain before nesting was completed in each of three years, and just at the end of nesting the fourth year.

1. In 1947 swift No. 16 failed to nest, even though he roosted nightly with female No. 42-188515 for nearly three weeks in shaft B1.

2. In 1948 No. 16 mated with female No. 42-196907, nesting somewhat later than the other breeding birds in the colony, and with a week's delay during nest construction. The nest was placed only six feet from the top of the shaft in B1. On July 12 a heavy rain washed the nest with its three eggs off the wall. The parent birds then separated.

3. In 1949 No. 16 mated with female No. 42-188550 in B1. Again there was delay in nest construction and it was placed only 6.6 feet down in the shaft. A week after three nestlings had hatched the nest was washed away during a rainstorm. Two nestlings survived and were cared for at the bottom of the shaft.

4. In 1950 the same parents returned to the same shaft, were slow in nest building, and placed it in the same precarious position. Ten days after two eggs hatched the nest was washed from the wall for the third time. The nestlings survived the crash and were attended at the bottom of the shaft.

5. In 1951 No. 16 went into shaft E6 and mated with No. 42-196904. Their nest was placed 8.1 feet from the top and remained on the wall just long enough for nesting to be completed before it, too, was washed away.

*Kent State University, Kent, Ohio, September 18, 1951.*

---

## BIRDS FROM POPOCATÉPETL AND IXTACCÍHUATL, MEXICO.

BY RAYMOND A. PAYNTER, JR.

DURING a recent expedition in Mexico, a short collecting trip was made to the mountains of Popocatépetl and Ixtaccíhuatl on the border of the states of Mexico and Puebla. A period from October 31 through November 5, 1950, at altitudes of over 3,000 meters, yielded a collection containing 29 species. Except for a few forms that were observed but not collected and, without doubt, some rarer species that were not seen, the collection probably very nearly represents the total number of forms found above 3,000 meters at that season and year. However, the fall and winter of 1950-51 were unusually cold, with the snow-line considerably lower than in most years, and more species probably would be found in a milder year during the same period.

Although many records from Popocatépetl and Ixtaccíhuatl appear in 'Biologia Centrali-Americana' and various taxonomic papers, there appears to be no published study concerned solely with the distribution of the avifauna on these two mountains.

I wish to thank the authorities of the Museum of Comparative Zoology, the Chicago Natural History Museum, and the American Museum of Natural History for loaning me comparative material in their care, and Dr. G. M. Sutton for generously allowing me to use specimens from his personal collection.

On October 31 a collection was made on the northern slope of Popocatepetl at an altitude of 4,050 meters, at which point the pines reach their upper limit. Lumbering operations have thinned the forests and large areas are now covered with grass and only a few trees. Juncos, bluebirds, nuthatches, and chickadees were abundant.

November 1 was spent on the southern slopes of Ixtaccihuatl from an altitude of 4,080 meters down to about 3,800 meters. The pines there are considerably more abundant than in the region covered on the first day. Woodpeckers were particularly abundant, and sparrows were found in great numbers in treeless weedy areas.

On November 2 work was conducted on the eastern side of the pass between the two mountains, known as Cortez Pass, at an elevation of around 3,800 meters. This area has been extensively lumbered, and the trees are widely spaced, giving a rather park-like appearance. Flickers, creepers, and wrens were more abundant there than in the other areas in which we worked.

On the third of the month we worked at an altitude of 3,280 meters on the slopes of the western side of the pass. The region is thickly wooded with pines, firs, and deciduous trees. Collecting was strikingly poor, in spite of the varied vegetation, presumably because the temperature was near the freezing point and the area was shadowed by a large cliff for the greater part of the morning.

The fourth and fifth of the month were spent slightly farther down the western side of the pass at an altitude of 3,230 meters. Mixed firs, and a few pines, interspersed with abundant second growth and grassy patches, afforded diverse habitats suitable for many species. Our best collecting was found there. Undoubtedly, further work would have added some of the less abundant species to the collection, but unforeseen circumstances made it necessary to terminate our work prematurely.

#### ANNOTATED LIST OF SPECIES COLLECTED AND OBSERVED

*Coragyps atratus* (Bechstein). BLACK VULTURE. Vultures were observed every day in small numbers. Although there seemed to be little carrion available, they were often seen soaring high above Cortez Pass.

*Falco sparverius* subsp. SPARROW HAWK. In the meadows between the mountains, Sparrow Hawks were regularly seen perched on slight rises or rocky outcrops. A few were also noted in the less dense pine regions.

*Glaucidium gnoma gnoma* Wagler. PYGMY OWL. The only specimen secured, a female on Nov. 4, was perched on a dead limb in a patch of sunlight within a dense forest. It weighed 54.3 grams. No others were seen or heard.

*Hylocharis leucotis leucotis* (Vieillot). WHITE-EARED HUMMINGBIRD. Two males taken on Nov. 3. This wide-ranging species was fairly common where lumbering operations have thinned the forest and permitted the growth of low bushes and flowers. One bird had small gonads and weighed 4.0 grams, whereas the other, which weighed 3.7 grams, had enlarged testes. Apparently the breeding season of this species is variable as well as extended. The 'Check-List of the Birds of Mexico' (Friedmann, Griscom, and Moore, 1950:169) lists birds in breeding condition in January through March, and May through August, and to this now may be added a November record.

*Lampornis clemenciae clemenciae* (Lesson). BLUE-THROATED HUMMINGBIRD. One male taken Nov. 5. This immature bird, with its rectrices partially sheathed, was the only one of its species seen. Its weight was 9.5 grams.

*Colaptes cafer mexicanus* (Swainson). MEXICAN RED-SHAFTED FLICKER. Flickers were common in the rather open forests on the eastern side of the pass, but they were difficult to collect owing to their excessive shyness. They were also seen at times in the firs, but they were not so abundant as at higher altitudes. The only specimen taken, a female on Nov. 2, weighed 116.5 grams.

*Dendrocopos stricklandi aztecus* Moore. AZTEC WOODPECKER. One male, Oct. 31; three males and one female, Nov. 1. I have not had an opportunity to compare these birds with other material, but Moore (1946) includes Popocatepetl within the range of *D. s. aztecus* and states that birds from there are intergrades. This is borne out by the moderate streaking on the posterior underparts of my specimens, rather than the immaculate white which Moore has described in typical *aztecus*. Aztec Woodpeckers were very abundant in the open pines at the foot of Popocatepetl, but they were not seen at lower altitudes. The males weighed 35.9, 36.7, 37.8, and 40.3 grams, and the female, 34.0 grams.

*Corvus corax* subsp. RAVEN. Ravens were seen daily from the highest altitudes at which we worked down to the fields outside of Amecameca.

It was surprising that *Aphelocoma coerulescens* was not recorded since Stone (1890:214) found it up to 11,000 feet on both mountains.

*Parus sclateri sclateri* Kleinschmidt. MEXICAN CHICKADEE. One male, Oct. 31; 1 male, 1 female?, and 1?, Nov. 1. The two males weighed 9.8 and 10.1 grams, and the two specimens of doubtful sex 10.1 and 10.5 grams. Chickadees were common in the pines but were seldom seen farther down the mountains.

*Sitta pygmaea chihuahuae* van Rossem. CHIHUAHUA NUTHATCH. Four males and 1 female, Oct. 31. These five specimens, all in fresh plumage, are indistinguishable from specimens of *chihuahuae* from Durango and Chihuahua. The weights of the four males were 9.9, 10.0, 10.0, and 11.4 grams. An adult male from Laguna del Progreso, Durango, in the collection of the Chicago Natural History Museum, weighed 9.7 grams. Nuthatches were very abundant in the pines at the first three collecting stations, but they were not seen below these altitudes.

Sumichrast (1869:544) has recorded *Sitta carolinensis* from Popocatepetl, and Stone (1890:217) recorded it from Ixtaccihuatl, but none was seen during our collecting.

*Certhia americana alticola* G. S. Miller. EAST MEXICAN CREEPER. One male and 1?, Nov. 2; 1?, Nov. 3. Creepers were found at all stations, but they were most common in the open pines. The male weighed 9.0 grams, and the two unsexed specimens, 6.9 and 7.9 grams.

*Heleodytes megalopterus megalopterus* (Lafresnaye). HUITZILAS CACTUS WREN. One male and 2 females, Nov. 5. Cactus wrens were only found in a glen of mixed coniferous and deciduous trees where a pair of noisy birds flew to the top of a flowering tree about 20 feet high, which was just receiving the first sun of the morning. These birds were collected and proved to be a male and a female. In a short while another pair flew into the same tree and a female was collected. The remaining bird stayed close by, calling loudly as the mate of the first bird had done, but remained well concealed and could not be collected. The male weighed 33.5 grams, and the females, 33.0 and 32.8 grams.

*Troglodytes brunneicollis culequita* van Rossem. BROWN-THROATED WREN. One male, Nov. 1; 1 male, and 2 females, Nov. 2; 1 female, Nov. 3. These wrens were common at higher altitudes where they were found in underbrush or in high grass. The two males weighed 12.4 and 12.6 grams, and the females, 11.5, 12.1, and 12.6.

A series of over 160 specimens of this montane species has been assembled from nearly all the localities where it is known to occur. Although there are no records from several states of central Mexico, where future collecting will undoubtedly reveal its presence, it seems well to review briefly its known distribution. A number of races have been described during the last 15 years, and the literature is in considerable confusion. I have not seen specimens of *T. b. vorhiesi* which has been described by Brandt (1945) from the Huachuca Mountains of Arizona, and the discussion must be confined to Mexican birds.

Four of the five Mexican races that I have been able to recognize show a cline toward lighter coloration from south to north. Although collecting has been spotty, a number of areas of intergradation are apparent. The fifth race, a population in southern Jalisco and western Michoacán, is lighter ventrally than more southern birds, but the coloration of the upper parts is quite distinct.

On the whole, immature specimens are of little aid in racial identification. They are usually considerably darker than mature birds, with reduced barring on the back and lower abdomen and flanks, and are squamated on the breast and throat. These characters vary considerably within a population, although the south to north cline in coloration is usually apparent if a sufficiently large series is at hand.

The adults in a given population are somewhat variable also, but not to the extent of the immatures. No consistent differences in the wing, tail, or bill measurements between adult populations are evident. The sexes are alike.

The various races may be characterized as follows:

*Troglodytes brunneicollis brunneicollis* Sclater.

*Troglodytes brunneicollis* Sclater, Proc. Zool. Soc. London, 26: 297, 1858. (La Parada, six leagues from Oaxaca, Oaxaca.)

*Synonyms.*

*Troglodytes brunneicollis nitidus* Nelson, Proc. Biol. Soc. Wash., 16: 158, 1903. (Mount Zempoaltepec, Oaxaca.)

*Troglodytes brunneicollis guerrensis* van Rossem, Bull. Brit. Ornith. Club, 59: 12, 1938. (Omilteme, Guerrero.)

This is the darkest of the five races. It most nearly resembles *culequita*, but the ventral barring is more distinct, often extending well forward on the abdomen, and the brown of the underparts is usually darker. The back is less grayish-brown, and the barring is usually more extensive and distinct.

I agree with van Rossem (1938:13) that *T. b. nitidus* Nelson, which was described from Mount Zempoaltepec, Oaxaca, is indistinguishable from the nominate race.

However, neither am I able to discern any constant differences between topotypic material of *brunneicollis* and that of *T. b. guerrensis* van Rossem from the state of Guerrero. A few specimens from Guerrero are duller brown above, but the same variation can be found in the limited Oaxacan material available.

One specimen from Tetela del Volcan, Morelos, is referable to *brunneicollis* whereas two others from the same locality are nearer to *culequita*. The range of the nominate race may then be defined as including Oaxaca and Guerrero, with intermediates in Morelos.

*Troglodytes brunneicollis culequita* van Rossem.

*Troglodytes brunneicollis culequita* van Rossem, Bull. Brit. Ornith. Club., 59:13, 1938. (Coajimalpa = Tacubaya, Mexico, D. F.)

This race is intermediate in coloration between *brunneicollis* in the south and *compositus* in the northeast. It differs from the nominate race as has been noted and from *compositus* in being slightly darker both dorsally and ventrally with more distinct barring on the lower abdomen and flanks.

It is found in Mexico, D. F., and the states of Mexico, Puebla, Tlaxcala, Veracruz, and Hidalgo.

*Troglodytes brunneicollis compositus* Griscom.

*Troglodytes brunneicollis compositus* Griscom, Bull. Mus. Comp. Zool., 75: 395, 1934. (Galindo, Tamaulipas.)

As may be seen from the above, *compositus* is lighter and less heavily barred above and below than *culequita*, and darker and more heavily barred than *cahooni*.

The range is San Luis Potosí, western Tamaulipas, Nuevo Leon, and at least south-eastern Coahuila from Sierra Guadalupe, the only locality in the state from which specimens are available.

*Troglodytes brunneicollis cahooni* Brewster.

*Troglodytes cahooni* Brewster, Auk, 5: 94, 1888. (near Oposura = Moctezuma, Sonora.)

This is the lightest of the races. The brown of the ventral region is much paler and the barring less distinct. The upper parts are grayish-brown and the barring is often considerably reduced and confined to the mid-back.

It is found in eastern Sonora as a summer visitant (van Rossem, 1945: 190), and as a resident in Chihuahua, Durango, and in Jalisco as far south as Guadalajara.

*Troglodytes brunneicollis colimae* van Rossem.

*Troglodytes brunneicollis colimae* van Rossem, Bull. Brit. Ornith. Club, 59: 14, 1938. (Sierra Nevada de Colima, Jalisco.)

This dark race is slightly lighter than the nominate race in the coloration of the underparts, but the barring is less extensive and intense, in which respect it is very much like *culequita*. The back is usually dark reddish-brown and the rump lighter, differing quite radically from *brunneicollis*. The race as a whole is variable and often single specimens from a given locality are difficult to place, but with a series the characters are always evident in at least a majority of the specimens. The immature birds are much more heavily squamated than are birds of equal age from any other race, and the brown of the ventral region is often quite grayish.

In Jalisco the race is confined to the southernmost part of the state and extends at least as far east as Pátzcuaro, Michoacán. Specimens from Guadalajara show no approach to *colimae*, even though the distance from that locality to the Sierra Nevada de Colima is less than the distance from those mountains to Pátzcuaro.

*Turdus migratorius permixtus* Griscom. ROBIN. One male, Nov. 4. The problem of defining and distinguishing the races of Mexican robins is difficult and not settled to my satisfaction. I have at hand a series of nine specimens from Guerrero, five from Tamaulipas, one from Cortez Pass, Mexico, and a male and a female taken in December on Isla Holbox, off the coast of Quintana Roo. This series is not large enough to attempt any detailed study of *Turdus migratorius* in Mexico, but a few general observations may be of use to future students.

All the resident Mexican robins can be distinguished easily from *T. m. propinquus* by their smaller size. I have been unable to discover any size difference between *permixtus* of Guerrero and *phillipsi* of Tamaulipas, but the latter series has only one male and the former series only two females, and therefore comparison is difficult and uncertain. However, mature birds from Guerrero and Tamaulipas, taken in the same season, are generally distinguishable if allowance is made for foxing. The heads of *permixtus* are usually darker, the throats more heavily streaked, and the backs slightly darker. However, the latter character alone is not always a reliable means of identification. Several specimens from Guerrero are considerably darker below than any from Tamaulipas, but the variation in color of the under parts is so wide, I am doubtful of its usefulness in identification. Possibly a larger series would bring out a consistency which is now obscured. Only a few specimens show all three principal characters, but a combination of two characters is usually found.

The single specimen from Cortez Pass matches a specimen from Guerrero, except for its bill which is entirely dark, and in that respect it differs from all the specimens at hand. It therefore appears that the range of *permixtus* should be amended to include the Popocatepetl-Ixtaccihuatl region. Material from the state of Morelos would be of great interest.

The two specimens from Isla Holbox pose another problem. In the amount of streaking on the throat and the coloration of the head, they are very much like *permixtus*. The coloration of their backs approaches *permixtus* also but does not match exactly any of the series. Their measurements are perhaps the most strikingly different characters. The wing of the male is 130 mm. and that of the female 121 mm. Both of these measurements are distinctly smaller than those of any Mexican robins I have examined. The possibility that they are *achrusterus* is precluded by the presence of only a trace of white on the tips of the tails. It appears that these two birds represent an undescribed race. There are no previous records of robins from the Yucatan Peninsula, and it is doubtful that they breed on Holbox. Because of the known variation and difficulty in identifying Mexican robins, it seems best to defer naming this race until the breeding area and more specimens are known.

*Myadestes obscurus obscurus* Lafresnaye. BROWN-BACKED SOLITAIRE. Two males and 1 female, Nov. 5. Solitaires were fairly common in the thicker forests. They were not seen at higher altitudes. The two males weighed 43.0 and 41.0 grams, and the female, 44.1 grams.

*Sialia mexicana australis* Nelson. NELSON'S BLUEBIRD. Two males, and 1 female, Oct. 31; 1 male, Nov. 2. Bluebirds were abundant at the base of Popocatepetl, in the open pine region, and also on the eastern side of Cortez Pass. They were not seen at the base of Ixtaccihuatl, presumably because the pines were too dense. The males weighed 26.7, 26.9, and 26.8 grams, and the female, 30.0 grams.

*Regulus regulus atescens* Lawrence. GOLDEN-CROWNED KINGLET. Three males, and 1 female, Nov. 4. The systematic position of Mexican Golden-crowned Kinglets has been open to considerable debate. Lawrence described *atescens* from a single specimen from Mexico, D. F. It is much darker below than any known specimens

and was considered by Nelson (1898: 160) as an unusually dark winter form of *olivaceus*. Dearborn (1907: 134) examined the type of *aztecus*, when he described *clarus* from Guatemala, and he too considered it a dark example of *olivaceus*. Hellmayr (1934: 511-512) questioned this identification and believed eventually it would be found that all Mexican kinglets could be placed with the Guatemalan race, since he had a specimen from Hidalgo which he assigned to *clarus*. However, more recently Wetmore (1941:565) examined the type of *aztecus* and stated that it agreed exactly with specimens from Guatemala, and therefore all the Mexican and Guatemalan birds should be united under the name *aztecus*.

The four fresh specimens from the Popocatepetl-Ixtaccihuatl region are considerably darker ventrally than topotypic specimens of *clarus* and are darker than a series of *olivaceus* from the United States. On the back they are slightly darker olive-green than *clarus* and brighter than *olivaceus*. The specimen from Real del Monte, Hidalgo, that was examined by Hellmayr, is old and foxed, but it is darker below than specimens of equal age from Guatemala. It may be placed with the four fresh specimens if account is taken of its age. Dr. S. Dillon Ripley has kindly compared the type of *aztecus* with the four new birds and found that it is more olive-brown ventrally and on the nape. It is even more distinctive when compared with Guatemalan specimens, contrary to Wetmore's findings. Therefore, in Guatemala and Mexico there are three distinct color types, *i. e.*, the lighter Guatemalan birds, the darker birds from Popocatepetl, Ixtaccihuatl, and Hidalgo, and the very dark specimen of *aztecus* from Mexico, D. F. It does not seem that a bird from the Federal District would be subspecifically distinct from birds a few miles to the east and to the north, but it does seem possible that Lawrence's specimen was an unusually dark representative of the local population. Since the birds from the surrounding region tend to be dark, this condition does not appear improbable, and, until there is evidence to the contrary, all the kinglets of Mexico should be united under the single name of *aztecus*. Birds from Guatemala are of the race *clarus*, and a few specimens from Chiapas, which I have at hand, seem also to belong to that race.

*Regulus calendula calendula* (Linnaeus). RUBY-CROWNED KINGLET. One male, Oct. 31; 1 male, Nov. 1; 1 male, and 1 female, Nov. 2; 1 male, Nov. 3; 1 female, Nov. 4; 1 female, Nov. 5. Common to abundant at all stations. The males weighed 6.0, 5.6, and 6.1 grams, and the females, 5.6, 5.4, 5.3, and 6.1 grams.

*Ptilogonys cinereus cinereus* Swainson. MEXICAN PTILOGONYS. Four males and 1 female, Nov. 4. Several large and noisy flocks of this species were seen on November 4. They were not seen at higher altitudes nor on the following day in the same locality. The males weighed 32.3, 32.9, 33.6, and 33.7 grams, and the female, 34.4 grams.

*Vireo solitarius solitarius* (Wilson). SOLITARY VIREO. One male, Nov. 4. The only specimen seen was secured in a fir. This apparently represents a new record for the state of Mexico and is an unusual altitude record. It weighed 15.5 grams.

*Peucedramus taeniatus giraudi* Zimmer. OLIVE WARBLER. Two males, Nov. 1. A number of Olive Warblers was found in a flock of mixed warblers and kinglets in a small clearing within the denser stand of pines, at the base of Ixtaccihuatl. These were the only ones observed. Their weights were 9.5 and 10.3 grams.

*Dendroica auduboni memorabilis* Oberholser. ROCKY MOUNTAIN AUDUBON'S WARBLER. One male, Nov. 2. The only example of this species seen was taken in a small bush in an area extensively cleared by logging operations. The wing measures 85 mm., the tail, 62 mm., and its weight was 12.8 grams.

*Dendroica townsendi* (Townsend). TOWNSEND'S WARBLER. One male and 1 female, Nov. 4. There are very few published records of this warbler from Mexico.

The two specimens taken were found in the same fir at the same time. They were the only ones seen. The male weighed 9.1 grams and the female, 8.7 grams.

*Ergaticus ruber ruber* (Swainson). RED WARBLER. One female, Nov. 3; 1 male, 1 female, and 2 females?, Nov. 4. Red Warblers were very common in the low second growth and found nowhere else. The male weighed 8.7 grams, the females, 8.1 and 8.2 grams, and the birds of questionable sex, 7.6 and 8.0 grams.

*Basileuterus belli belli* (Giraud). BELL'S WARBLER. One male and 1 female, Nov. 5. These warblers were seen on several occasions on the ground or in low second growth. They were not seen above the mixed coniferous and deciduous zone. The male weighed 10.7 grams and the female, 10.2 grams.

*Icterus bullockii abeillei* (Lesson). ABEILLE'S ORIOLE. Two males and 1 female, Nov. 5. All three specimens were collected in the same flowering tree. A mature male and female flew to the tree together, and when the male was shot the female stayed close by. Since both birds had reduced gonads, it would seem to indicate that this species remains paired throughout the year. The mature male and female weighed 36.5 and 33.0 grams, respectively, and the immature male, 31.0 grams.

*Hesperiphona abeillei abeillei* (Lesson). ABEILLE'S GROSBEAK. One male, Nov. 4; 3 females, Nov. 5. On November 4 a flock of five grosbeaks was seen high in a fir in a mixed forest. The birds were well-hidden, and the proportion of the sexes could not be noted. The following day a flock of over ten birds was seen within a few feet of the tree where it had been the previous day. The birds were difficult to observe clearly, but as they were frightened from tree to tree, after each specimen was collected, no males were seen. The male weighed 49.7 grams and the females, 47.1, 48.0, and 49.3 grams. All had reduced gonads.

*Loxia curvirostra stricklandi* Ridgway. STRICKLAND'S CROSSBILL. One male, Oct. 31. Unfortunately, this male with slightly enlarged testes was the only specimen of this interesting race which was secured. The wing measures 105 mm. and the culmen, which was measured by Griscom's method (1937:138), is 21 mm. Its weight was 38.9 grams. Several other crossbills were seen singly on October 31. On November 2 a male and a female were seen high in a pine on the western side of Cortez Pass. Although there were abundant pine cones at higher altitudes no more crossbills were seen during the remainder of our work on the mountains.

*Pipilo erythrophthalmus vulcanorum* Sibley. SPOTTED TOWEE. One female, Nov. 4. Towees were common in dense, brushy thickets in the zone of mixed firs, pines, and deciduous trees, but they were very difficult to collect owing to their secretive habits. A number of birds were collected but were too badly shot to preserve. The wing measures 85 mm. It weighed 45.5 grams.

*Oriturus superciliosus* (Swainson). STRIPED SPARROW. Two males, Oct. 31; 1 female, and 1?, Nov. 1; 1 male, Nov. 2. An examination of specimens from Chihuahua, Sonora, Durango, Jalisco, Veracruz, and the five specimens from Popocatepetl and Ixtaccihuatl indicates that *O. s. palliatus* is untenable. van Rossem (1938: 127-128) named as the type specimen a bird collected in 1888 near Tutuaca, Chihuahua. It was described as differing from the nominate race in being paler throughout, redder dorsally, purer gray ventrally with the throat and median abdominal region nearly pure white, and with the central rectrices gray instead of olive or olive-brown laterally. It appears that these characters are a result of aging of the skin. A specimen collected at Pinos Altos, Chihuahua, in 1888 and another collected in 1892 and labeled as "N. Chihuahua" are indistinguishable from a specimen from Las Vigas, Veracruz, collected in 1897. The remainder of the material is at least 40 years old, except for the fresh specimens from Popocatepetl and Ixtaccihuatl. The

new specimens differ from all the rest in being considerably browner, rather than reddish-brown, above. The head bands are chocolate rather than brown or reddish-brown, and the specimens are much grayer ventrally. The gray on the back and sides of the neck is very pronounced, in marked contrast to the older specimens. A bird from Orizaba, Veracruz, collected in 1910, most nearly approaches the fresh specimens in being darker above and grayer below.

These sparrows were very common in the meadows and open pines at the first three collecting stations. The male weighed 38.6 grams, the females, 39.4, 39.7, and 41.5 grams, and the unsexed bird, 38.5 grams.

*Junco phaeonotus phaeonotus* Wagler. MEXICAN JUNCO. One male and 1 ♀, Oct. 31; 1 male, Nov. 1; 1 male, Nov. 2. Juncos were common in any open area from the highest altitude to the patches of weeds at the roadside on the plain outside of Amecameca. The males weighed 19.7, 19.9, and 23.0 grams, and the unsexed specimen, 22.4 grams.

*Spizella passerina* subsp. CHIPPING SPARROW. One male, Nov. 2. This specimen, which weighed 10.9 grams, is in immature plumage and cannot be placed sub-specifically. The wing measures 68.5 mm. and the tail 58.0 mm.

#### LITERATURE CITED

- BRANDY, H. 1945. A new wren from Arizona. *Auk*, 62: 574-577.
- DEARBORN, N. 1907. Catalogue of a collection of birds from Guatemala. *Field Mus. Nat. Hist., Orn. Ser.*, 1: 69-138.
- FRIEDMANN, H., L. GRISCOM, and R. MOORE. 1950. Distributional check-list of the birds of Mexico. Part I. *Pacific Coast Avif.*, no. 29: 1-202.
- GRISCOM, L. 1937. A monographic study of the Red Crossbill. *Proc. Bost. Soc. Nat. Hist.*, 41: 75-209.
- HELLMAYR, C. 1934. Catalogue of birds of the Americas. *Field Mus. Nat. Hist., Zool. Ser.*, 13 (8): vi + 531 pp.
- MOORE, R. 1946. A new woodpecker from Mexico. *Proc. Biol. Soc. Wash.*, 59: 103-106.
- NELSON, E. 1898. Notes on certain species of Mexican birds. *Auk*, 15: 155-161.
- STONE, W. 1890. On birds collected in Yucatán and southern Mexico. *Proc. Acad. Nat. Sci. Phila.*, 42: 201-218.
- SUMICHRIST, F. 1869. The geographical distribution of the native birds of the Department of Vera Cruz, with a list of the migratory species. *Mem. Bost. Soc. Nat. Hist.*, 1: 542-563.
- VAN ROSSEM, A. 1938. Notes on some Mexican and Central American wrens of the genera *Heleodytes*, *Troglodytes*, and *Nannorchilus*; and four new races. *Bull. Brit. Ornith. Club*, 59: 10-15.
- VAN ROSSEM, A. 1945. A distributional survey of the birds of Sonora, Mexico. *Occ. Papers Mus. Zool. La. State Univ.*, No. 21: 1-379.
- WETMORE, A. 1941. Notes on birds of the Guatemalan highlands. *Proc. U. S. Natl. Mus.*, 89: 523-581.

*Peabody Museum of Natural History, Yale University, New Haven, Connecticut, June 18, 1951.*

## A JOINT NESTING OF CARDINALS AND SONG SPARROWS

BY HERVEY BRACKBILL

IN Catonsville, Baltimore County, Maryland, in May, 1950, a single nest was used simultaneously by a pair of Cardinals, *Richmondena cardinalis*, and a pair of Song Sparrows, *Melospiza melodia*. Informed of the nesting during its final week, I then succeeded in making observations on three days—for periods of 1 hour on May 24, 1.5 hours on May 26, and periods of 2, 2, and 1.75 hours on May 27—and after the young left the nest I spent 3.5 hours on three days checking upon developments.

The nesting occurred at the home of Mr. and Mrs. Charles P. Wall. I owe thanks to their son-in-law, Harold W. Smith, for word of it, and to them for most obligingly making possible my study of it. Thanks are also tendered to Charles W. Purcell, Jr., for his interest and patience in getting the photographs that accompany this account, and to Mrs. Margaret M. Nice for reading the manuscript and making suggestions.

## THE NEST, EGGS, INCUBATION, AND CARE OF YOUNG

The nest was based four feet eight inches up in the heart of a seven-foot arbor vitae, *Thuja occidentalis*, beside the Wall home; because the foliage was thin on the house side of the tree, the nest was easily visible from a window six feet away. The happenings at it were noted casually by the Walls from the start of the nesting, at the beginning of May. On May 24, when I was told of it, it held three Cardinals about four days old, and one Song Sparrow egg that eventually proved to be addled.

Mrs. Wall relates that a Cardinal "began" the nest and then "abandoned it for a day or so." During that interval, a Song Sparrow appeared and "completed" it, narrowing its interior so much that when the Cardinal finally returned to lay her eggs she had to squirm about and stretch it before it would accommodate her. Obviously, the period of "abandonment" was the customary pause between building and laying; in the Cardinal this may be as long as six days (Laskey, 1944:32). For the rest, the nest itself supported Mrs. Wall's statements; the foundation and outer shell were shaggily made of weed stems, coarse grass, pieces of vine, and some leaves, in Cardinal fashion; the interior was substantially lined with fine grass and some human hair, in Song Sparrow fashion; grape bark in the nest-wall probably marked the point at which the Cardinal had put her lining.

Mrs. Wall believes that the Cardinal and Song Sparrow each laid three eggs, but is not sure; Mr. Wall cannot definitely recall seeing more than the four that are accounted for by the three Cardinal nestlings and one Song Sparrow egg. The order of laying is not known. Incubation was performed by both Cardinal and Song Sparrow, Mrs. Wall states; if the Song Sparrow arrived at the nest and found the Cardinal already on, she loitered in the vicinity until the Cardinal left, then began her sitting; if the Cardinal arrived at the nest and found the Song Sparrow sitting, she sat on top of the Song Sparrow.

Mrs. Wall states that both species also brooded the nestlings, the Cardinal again sometimes sitting on the Song Sparrow's back. She reported such joint brooding as late as May 28, during rain, and brooding by each species singly on May 29, during rain; the young were then about nine days old. I saw only the female Song Sparrow brood, for one period of ten minutes during an hour's watching on the evening of May 24, and for two periods totalling ten minutes during 1.5 hours' watching on the evening of May 26. Mrs. Wall usually saw the Cardinal on the nest as dusk fell, but it was then too dark inside the tree to tell if the Song Sparrow were beneath.

All four adults fed the nestlings; the Song Sparrows made more feedings than the Cardinals; the males made more than the females. As related below, the female Song Sparrow was apparently unsettled by her experiences, and the female Cardinal was shy during much of my watching. Food brought to the nest by the male Cardinal was sometimes relayed to the young by one of the Song Sparrows; details are given later. During my last day of watching at the nest I color-banded the female Song Sparrow; ensuing observations then confirmed judgments of sex, that I had made from behavior, and enabled confident allocation of previous feedings between male and female. The figures for number of feedings for my 8.25 hours of watching are: male Song Sparrow, 32; female Song Sparrow, 22 (for two hours after being banded, however, this bird was inactive); male Cardinal, 30; and female Cardinal, 13.

Despite the female's low activity, feedings by the Cardinals averaged 5.2 per hour. This compares with averages of 4.7 per hour at a normal nest I watched, 6.1 at the nest Laskey watched (1944:36), and 5.3 at these two combined. Excluding the period after banding, when the female Song Sparrow was inactive, feedings by this species averaged 7.5 per hour. Nice (1943:231) found an average of 11.1 at seven Song Sparrow nests, and believed a weighted figure of 12.5 might be more accurate. Thus the Cardinals alone fed these nestlings at a normal Cardinal rate, and the four adults together fed them at a normal Song Sparrow rate.

I saw feces carried from the nest as follows: by male Song Sparrow, 7 times; female Song Sparrow, 3; male Cardinal, 3; and female Cardinal, 1.

Two of the young Cardinals left the nest the evening of May 29, upon being banded; the third left the following evening. They shortly moved into a dense woods close by, where during such visits as I could make on later days I could hear them but never find them. On June 3 I repeatedly saw the banded female Song Sparrow fly in their direction, and I saw her presumed mate in the same area. The adult Cardinals were also in evidence. I believe both pairs were feeding the fledglings.

#### BEHAVIOR OF ADULTS

Mrs. Wall states that at no time during the nesting did she see any fighting among the birds. There was likewise no friction whatever during my observations; to the contrary, on nine occasions a Cardinal and a Song Sparrow were at the nest-rim simultaneously. Six times the combination was male Cardinal and female Song Sparrow, twice it was male Cardinal and male Song Sparrow, and once it was female Cardinal and female Song Sparrow. On four other occasions when the male Cardinal was at the nest, and one other when the female Cardinal was there, the female Song Sparrow was only a few inches away from the nest-rim.

The Song Sparrows, indeed, helped the male Cardinal make feedings. While the nestlings were small he seemed hesitant to feed them directly; often, if he arrived at the nest with food and found no other adult bird there, he would wait briefly, giving 'tsik' calls, then leave with his food, and return repeatedly at intervals of a few minutes until he did encounter another adult. This latter bird would then take his food and pass it to the nestlings. On May 24 the Cardinal made three of six feedings in that way, and on May 26 two of four. Three times the assisting Song Sparrow was the female, and twice the male. Three times the Cardinal came, or returned, to the nest while a Song Sparrow was present, and twice the female Song Sparrow came empty-billed to the nest on the heels of the Cardinal's arrival.

The female Song Sparrow did end one period of brooding as both Cardinals drew near the nest with food, calling; I do not know whether she could see them or whether she reacted to their calls. Also, each Song Sparrow once left the nest-rim as the male Cardinal arrived to make a feeding, and the male Cardinal once left it as both Song Sparrows arrived. All of these incidents are interpretable, however, simply as one bird involuntarily getting out of another's way. In the case of the male Cardinal this was very clear; he was at the nest for

the third time in six minutes, with food to be passed to the young, when the Song Sparrows' arrival caused him to fly, and he quickly returned while one of them was still present and gave it his food.

With the possible exception of the female Song Sparrow, the birds also displayed individual calm in the unusual situation. In watching the nest I stood, only partly concealed, about three feet back from an open window that was six feet from the nest. Despite this added circumstance, both males, on their feeding trips, came to the nest with no hesitancy whatever. My watching made the female Cardinal uneasy; on the first two days of observation and at the beginning of each observation period on the third day, she was very shy, making as many as seven approaches and retreats over a quarter-hour's time before feeding the young, and twice only going finally to the nest when the male preceded her there on feeding trips of his own. Finally accustomed to me, this bird also came and went freely and calmly.

The female Song Sparrow, on the other hand, spent 17 minutes of my first 60-minute observation period, and 13 minutes of my second 95-minute period, fidgeting at the nest or within a foot or so of it, and giving little 'ch' notes—this does not count time spent making feedings and brooding. On the third day she showed no such behavior. On the first two days I inspected the nest before beginning observations, but on the third day, not until I had completed them. Although it thus seems as though those inspections might have made the bird uneasy, the amount of time she spent at the nest, in plain sight, appears to be stronger evidence that she was not concerned over me. I believe she was really somewhat unsettled by her experience, but that she gradually calmed again.

While watching the nest, I was able to attribute one snatch of song to the male Cardinal, and a few brief bits on each day to the female Cardinal. The male Song Sparrow sang frequently; he gave from one to a number of songs after leaving the nest following 21 of the 32 feedings he made, and sang on many other occasions. This was possibly a little more singing than normal for both species (*cf.* Laskey, 1944:28, and Nice, 1943:145).

#### SUCCEEDING NESTINGS

On the afternoon of June 10 I flushed the banded female Song Sparrow from a new nest containing two eggs; on June 17 there were four eggs. I did not follow the nesting further. This nest was 9 feet east of the jointly-used one; it was based 6 feet 4 inches up in an 8.5-foot arbor vitae. Through June 17 I could locate no new Cardinal nest.

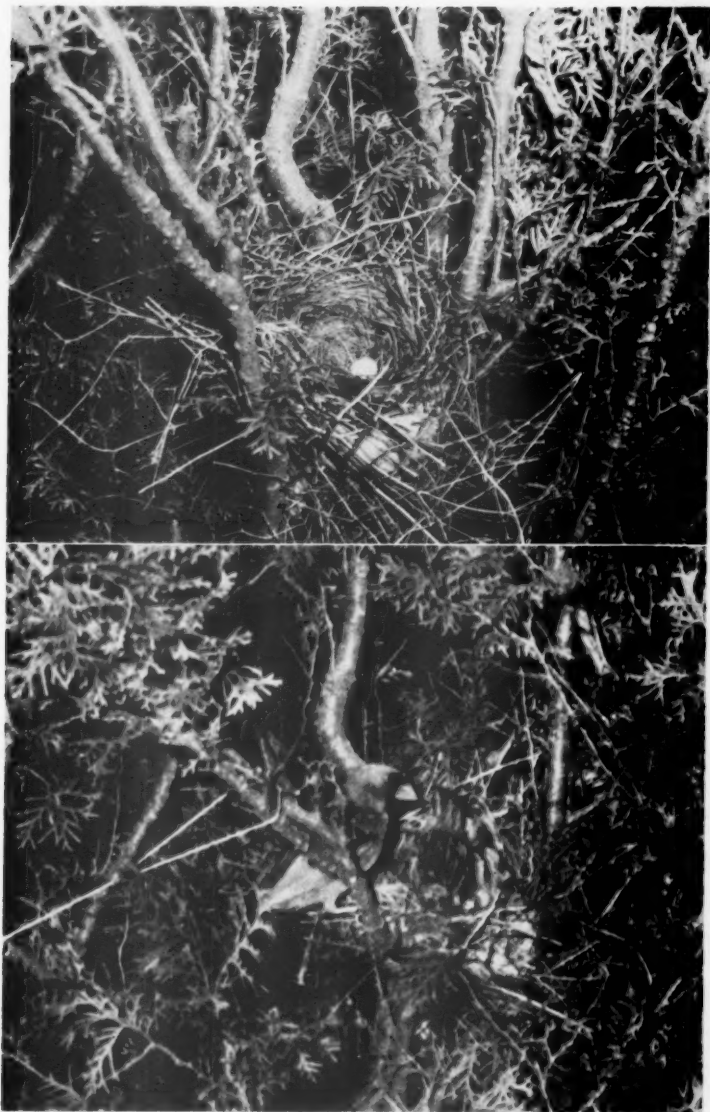
## PARALLELS IN THE LITERATURE

A search of the literature discloses several other instances of two species nesting together, and other examples of the unusual types of behavior that were exhibited at the nest I watched.

Davison (1887) found a Mourning Dove, *Zenaidura macroura*, and a Yellow-billed Cuckoo, *Coccyzus americanus*, incubating simultaneously on a nest that also held an egg of the Robin, *Turdus migratorius*; the nest had been begun by the Robin and added to by the cuckoo. In Bendire (1892:141) this cuckoo was identified as a Black-billed, *C. erythrophthalmus*; the nest and eggs were collected. Hagen (in Barrows, 1889:86) reported that "in a house with one entrance [Tree] Swallows [*Iridoprocne bicolor*] and Sparrows [*Passer domesticus*] brooded together, and both had young." Bailey and Niedrach (1936) found two joint nestings of Western Robins, *T. m. propinquus*, and House Finches, *Carpodacus mexicanus frontalis*; Robins were raised in both cases. Raney (1939) reported a Robin and a Mourning Dove alternately incubating mixed clutches at the same spot in two successive years; one nest was destroyed during incubation, and the other produced young that later died. Verschuren (1947) noted something similar—Swifts, *Apus a. apus*, and House Sparrows, *P. d. domesticus*, nesting simultaneously in the same hole in a wall, but presumably in separate nests.

Several records of two females, and two full pairs, of a single species using a nest together include one (Forbush, 1929:96) of two Song Sparrows laying in the same nest and incubating alternately; all four adults fed the eight young. Forbush (1929:156) also gave an account of two pairs of Tree Swallows using the same nest, and (1929:413) two female Robins laying in one nest and incubating together, one sometimes on the other's back. Howell (1942:536) wrote of another case like the last. Bellrose (1943) reported two Wood Ducks, *Aix sponsa*, laying in one nest and incubating side by side, and mentioned that two Canaries, *Serinus canaria*, often lay and incubate in one nest.

Among the records of adult birds feeding young of another species are these: Twombly (1934) wrote of a pair of Song Sparrows which, until their own eggs hatched, helped a nearby pair of Robins with feeding of the young and nest sanitation. Jackson (1941) saw one or two Song Sparrows help Yellow Warblers, *Dendroica petechia*, feed a brood; if the female warbler were on the nest the food was given to her and she passed it on to the young. Rea (1945) related that a Black and White Warbler, *Mniotilta varia*, which made some feedings at a nest of Worm-eating Warblers, *Helmitheros vermivorus*, was usually



(Top) NEST USED JOINTLY BY CARDINALS AND SONG SPARROWS, SHOWING EXTERIOR OF CARDINAL CONSTRUCTION AND INTERIOR OF SONG SPARROW CONSTRUCTION, WITH ADDLED SONG SPARROW EGG.

(Bottom) MALE CARDINAL AND FEMALE SONG SPARROW AT NEST USED JOINTLY BY THEM AND THEIR MATES, CATONSVILLE, MARYLAND, MAY 27, 1950. PHOTOS BY CHARLES W. PURCELL, JR.



attacked, but, "In one instance, the Worm-eating Warblers tore the food from his beak and themselves gave it to the young."

#### SUMMARY

In Catonsville, Maryland, in 1950, a pair of Cardinals and a pair of Song Sparrows used the same nest simultaneously. The nest initially belonged to the Cardinals, but was given a Song Sparrow lining. Both females laid eggs; both incubated and brooded, sometimes jointly. All four adults fed the young and cleaned the nest. There was no interspecific fighting, and there was collaboration in feeding young. Except that the female Song Sparrow appeared nervous, and song may have slightly exceeded the usual amount, individual behavior was normal. Three Cardinals were raised. After their departure there was left in the nest one Song Sparrow egg that had developed only slightly. The Song Sparrows apparently helped the adult Cardinals to feed the fledglings for a time. The succeeding nesting of the Song Sparrows was normal.

#### LITERATURE CITED

- BAILEY, ALFRED M., AND ROBERT J. NIEDRACH. 1936. Community nesting of Western Robins and House Finches. *Condor*, 38:214.
- BARROWS, WALTER B. 1889. The English Sparrow in North America. U. S. Dept. Agri. Bull., 1: 405.
- BELLROSE, FRANK, JR. 1943. Two Wood Ducks incubating in the same nesting box. *Auk*, 60:446-447.
- BENDIRE, CHARLES. 1892. Life histories of North American birds. U.S. Natl. Mus., Spec. Bull., 1:viii + 446.
- DAVISON, J. L. 1887. Birds laying their eggs in the nests of other birds. *Auk*, 4:263-264.
- FORBUSH, EDWARD HOWE. 1929. Birds of Massachusetts and other New England states. (Mass. Dept. Agri., Boston), Vol. 3.
- HOWELL, JOSEPH C. 1942. Notes on the nesting habits of the American Robin. *Amer. Midl. Nat.*, 28: 529-603.
- JACKSON, MRS. R. E. 1941. Song Sparrows assume role of foster parents. *Bull. Mass. Aud. Soc.*, 25:134.
- LASKEY, AMELIA R. 1944. A study of the Cardinal in Tennessee. *Wilson Bull.*, 56:27-44.
- NICE, MARGARET M. 1943. Studies in the life history of the Song Sparrow, II. *Trans. Linn. Soc. N.Y.*, 6:viii + 329.
- RANEY, EDWARD C. 1939. Robin and Mourning Dove use the same nest. *Auk*, 56:337-338.
- REA, GENE. 1945. Black and White Warbler feeding young of Worm-eating Warbler. *Wilson Bull.*, 57:262.
- TWOMBLY, FRANCES DOANE. 1934. "Believe it or not!" *Bird-Lore*, 36:303.
- VERSCHUREN, JACQUES. 1947. Une cohabitation étrange. *Gerfaut*, 37:106-107.

4608 Springdale Avenue, Baltimore 7, Maryland, October 2, 1951.

TWENTY-SEVENTH SUPPLEMENT TO THE AMERICAN  
ORNITHOLOGISTS' UNION CHECK-LIST  
OF NORTH AMERICAN BIRDS<sup>1</sup>

PROPOSALS for additional forms and for change in status and in name that have been accepted by action of the Committee to December, 1951, are presented in the following list. The Committee met for discussion during the A.O.U. meeting in Montreal and has conducted much additional business by mail. Material for revision of ranges in the final family of the Passeriformes, the Fringillidae, is now under way, but there remains much further work before the manuscript for the fifth edition of the Check-list is complete.

Besides the material in the body of the present supplement, the Committee has considered recent statements relative to the date of publication of the two volumes of Pallas' *Zoographia Rosso-Asiatica*, and holds, in accordance with earlier decisions, that this work is to be accepted as of 1811, and not of a later date.

In view of some recent statements that have come to the Committee, it is desirable to call attention to the fact that procedures relative to the names of birds included in the Check-list of North American Birds are governed by the American Ornithologists' Union Code of Nomenclature. This code was printed in the first edition of the Check-list in 1886 and was issued in separate form in 1892. It was revised to some extent with amplification of some of the Canons in 1908, the principal change being in the method of determining the types of genera, which was modified to conform with that found in Article 30 of the International Code of Zoological Nomenclature. The basic rules, therefore, have been in force for 65 years and still continue, with the exception of one further modification, relative to the "One-letter Rule," set forth in the Twenty-second Supplement to the Check-list (Auk, Vol. 64, July, 1947, pp. 445-446). This change, mainly concerning generic names, was made after careful study, in order to establish conformity for names of wide-ranging groups which appear in check-lists dealing with other parts of the world.

Committee

ALEXANDER WETMORE, Chairman  
HERBERT FRIEDMANN, Vice-Chairman  
FREDERICK C. LINCOLN  
ALDEN H. MILLER  
JAMES L. PETERS  
JOSSELYN VAN TYNE  
JOHN T. ZIMMER

<sup>1</sup> The Twenty-sixth Supplement was published in *The Auk*, vol. 68, no. 3, July, 1951, pp. 367-369.

Page

33. *Guara* Reichenbach, 1853, becomes *Eudocimus* Wagler, 1832, as the latter is not preoccupied by *Eudocima* Billberg, 1820, for a genus of Lepidoptera. See Parkes, Proc. Biol. Soc. Washington, vol. 64, April 13, 1931, p. 61.  
*Eudocimus* Wagler, Isis von Oken, 1832, col. 1232. Type, by subsequent designation, *Scolopax rubra* Linnaeus (Reichenow, Journ. f. Orn., vol. 25, 1877, p. 145).  
The species will stand as follows:  
*Eudocimus albus* (Linnaeus).  
*Eudocimus ruber* (Linnaeus).
36. *Olor* Wagler is recognized as a genus distinct from *Cygnus*, for the Whooper, Whistling, and Trumpeter swans. Treatment in the Check-list will stand as follows:  
Genus *Olor* Wagler, Isis von Oken, 1832, col. 1234. Type, by subsequent designation, *Cygnus musicus* Bechstein = *Anas cygnus* Linnaeus (Gray, 1840).  
Subgenus *Olor* Wagler.  
*Olor cygnus* (Linnaeus).  
*Olor columbianus* (Ord).  
Subgenus *Clangoccygnus* Oberholser.  
*Olor buccinator* (Richardson).
37. *Branta canadensis* maxima Delacour. GIANT CANADA GOOSE. [172h.] *Branta canadensis maxima* Delacour, Amer. Mus. Novit., no. 1537, November 12, 1951, p. 5. (Round Lake, Grant County, Minnesota.) Additional subspecies. North Dakota and Kansas to Minnesota, western Kentucky, Tennessee, and northern Arkansas. Now extinct.
37. *Branta canadensis fulva* Delacour. QUEEN CHARLOTTE CANADA GOOSE. [172i.] *Branta canadensis fulva* Delacour, Amer. Mus. Novit., no. 1537, November 12, 1951, p. 7. (Graham Island, Queen Charlotte Islands, British Columbia.) Additional subspecies. Glacier Bay, Alaska, south along the coast and islands to northern Vancouver Island, British Columbia.
40. As the Pink-footed Goose and Bean Goose are now considered to be geographic races of the same species, for which the specific name is *Anser fabalis* Latham, the Pink-footed Goose will be listed as *Anser fabalis brachyrhynchus* Baillon. See Witherby, Jourdain, Ticehurst, and Tucker, Handb. Brit. Birds, vol. 3, 1939, pp. 193, 197.
48. *Anas cyanoptera cyanoptera*, NORTH AMERICAN CINNAMON TEAL, through recognition of a northern subspecies, becomes *Anas cyanoptera septentrionalium* Snyder and Lumsden, Occ. Papers Roy. Ontario Mus. Zool., no. 10, August 10, 1951, p. 16. (2 miles south of Jensen, Utah.)
79. *Dendragapus obscurus oreinus* Behle and Selander. GREAT BASIN BLUE GROUSE. [297h.] *Dendragapus obscurus oreinus* Behle and Selander, Proc. Biol. Soc. Washington, vol. 64, November 19, 1951, p. 125. (Three miles north of Queen of Sheba Mine, west side of Deep Creek Mountains, 7500 feet elevation, Juab County, Utah.) Additional subspecies. Deep Creek Mountains, Utah; Snake Range, Ruby Mountains, and Toyabe Range, Nevada.
83. *Lagopus mutus saturatus* Salomonsen. WEST GREENLAND ROCK PTARMIGAN. [302k.] *Lagopus mutus saturatus* Salomonsen, Dansk. Orn. For. Tidsskr., vol. 44, pt. 4, December 5, 1950, p. 221. (Skansen, Disko Island, West

- Greenland.) Additional subspecies. Northwestern Greenland, from Upernavik District south to Egedesminde District.
83. *Lagopus mutus yunaskensis* Gabrielson and Lincoln. YUNASKA ROCK PTARMIGAN. [302L.] *Lagopus mutus yunaskensis* Gabrielson and Lincoln, Proc. Biol. Soc. Washington, vol. 64, April 13, 1951, p. 63. (Yunaska Island, Aleutian Islands.) Additional subspecies. Yunaska Island, Aleutian Islands, Alaska.
118. *Erolia maritima groenlandica* (Løvenskiöld), described from Greenland, and accepted in the Twenty-sixth Supplement, Auk, vol. 68, July, 1951, p. 368, is dropped from the list, since further information shows that it is too poorly differentiated to warrant a name. See Salomonsen, Grönlands Fugle, pt. 2, 1951, pp. 230-231. The North American bird then reverts to a binomial, *Erolia maritima*.
159. *Cuculus canorus bakeri* is dropped from the list since the specimens on the basis of which it has been included prove to be *Cuculus saturatus horsfieldi*. See Deignan, Condor, vol. 53, May, 1951, pp. 154-155.
164. *Otus asio gilmani* becomes a synonym of *Otus asio cineraceus*, since the type of *gilmani* is identified as a specimen of *cineraceus*. See A. H. Miller and L. Miller, Condor, vol. 53, no. 4, July 26, 1951, pp. 169-172.
164. *Otus asio yumanensis* Miller and Miller. SAHUARO SCREECH OWL. *Otus asio yumanensis* A. H. Miller and L. Miller, Condor, vol. 53, no. 4, July 26, 1951, p. 172. (10 miles west of Pilot Knob, 1 mile south of United States-Mexican boundary, Baja California, México.) New name for the race formerly called *Otus asio gilmani*. The number remains that used for *O. a. gilmani*.
177. The genus *Nephoecetes* is united with *Cypseloides*. See Zimmer, Auk, vol. 62, no. 4, October, 1945, pp. 589-590.
- Cypseloides* Streubel, Isis von Oken, 1848, col. 366. Type, by subsequent designation, *Hemiprocne fumigata* Streubel (Sclater, 1865). The form in our Check-list will stand as follows:
- Cypseloides niger borealis* (Kennerly).
188. *Colaptes cafer sedentarius* van Rossem, added in the Twentieth Supplement, Auk, vol. 62, no. 3, July, 1945, p. 442, is found on further data to be inseparable from *Colaptes cafer collaris*, and is dropped from the Check-list. See Miller, Univ. Calif. Publ. Zool., vol. 50, no. 6, September 14, 1951, p. 620.
220. *Perisoreus canadensis fumifrons* Ridgway, 1880, becomes *Perisoreus canadensis pacificus* (Gmelin), 1788, from *Corvus pacificus* Gmelin, Syst. Nat., vol. 1, pt. 1, 1788, p. 372. (In insulis maris australis = Norton Sound, Alaska.) See Stresemann, Ibis, vol. 91, no. 2, April, 1949, pp. 252, 255.
221. *Perisoreus canadensis pacificus* A. H. Miller, 1943, preoccupied by *Perisoreus canadensis pacificus* (Gmelin), 1788, is renamed *Perisoreus canadensis arcus* A. H. Miller, Condor, vol. 52, no. 1, January 24, 1950, p. 46.
222. *Cyanocitta stelleri percontatrix* van Rossem, accepted in the Twentieth Supplement, Auk, vol. 62, no. 3, July, 1945, p. 445, is a synonym of *Cyanocitta stelleri macrolopha* Baird. See Phillips, Condor, vol. 52, no. 6, December 6, 1950, pp. 252-253.
224. *Aphelocoma coerulescens immanis* Grinnell, recorded as a synonym of *Aphelocoma coerulescens superciliosa* (Strickland) in the Twentieth Supplement, Auk, vol. 62, no. 3, July, 1945, p. 445, is recognized as distinct from *superciliosa* for the birds of the Willamette Valley in southern Washington and western Oregon. See Pitelka, Univ. California Publ. Zool., vol. 50, no. 3, July 20, 1951, pp. 266, 395-398.

224. *Aphelocoma coerulescens superciliosa* (Strickland), SACRAMENTO SCRUB JAY, will be numbered 481g.
225. *Xanthoura yncas glaucescens* becomes *Xanthoura yncas luxuosa* (Lesson), from *Garrulus luxuosus* Lesson, Rev. Zool., April, 1839, p. 100. (México.) See Sutton, Condor, vol. 53, no. 3, May 29, 1951, pp. 124-128.
225. The number for *Cissilopha san-blasiana nelsoni*, added in the Twenty-sixth Supplement, Auk, vol. 68, no. 3, July, 1951, p. 368, should be 483.1, not 483.
229. *Parus atricapillus garrinus* Behle. ROCKY MOUNTAIN BLACK-CAPPED CHICKADEE. [735h.] *Parus atricapillus garrinus* Behle, Auk, vol. 68, no. 1, January, 1951, p. 75. (Near Merkley Park, 5500 feet, Ashley Canyon, 10 miles north of Vernal, Uintah County, Utah.) Additional subspecies. Eastern Idaho and southern Montana to eastern Utah and northern New Mexico.
232. *Parus cinctus alascensis* (Pražák), 1895, becomes *Parus cinctus lathami* Stephens, 1817, from *Parus Lathami* Stephens, in Shaw, Gen. Zool., vol. 10, pt. 1, 1817, p. 44. (Norton Sound, Alaska.) See Stresemann, Ibis, vol. 91, no. 2, April, 1949, pp. 252, 255.
243. *Troglodytes troglodytes seguamensis* Gabrielson and Lincoln. SEGUAM WINTER WREN. [722i.] *Troglodytes troglodytes seguamensis* Gabrielson and Lincoln, Proc. Biol. Soc. Washington, vol. 64, May 14, 1951, p. 73. (Seguam Island, Aleutian Islands, Alaska.) Additional subspecies. Seguam, Amukta, and Yunaska islands, Aleutian Islands, Alaska.
262. *Luscinia svecica robusta* Buturlin, 1905, becomes *Luscinia svecica awatcha* (Gmelin) from *Molacilla Awatcha* Gmelin, Syst. Nat. vol. 1, pt. 2, 1789, p. 986. (In Kamtschatka = Kamchatka.) See Stresemann, Ibis, vol. 91, no. 2, April, 1949, pp. 253, 255. The change in the specific name from *suecica* to *svecica*, used also in the Twenty-fifth Supplement, Auk, vol. 67, no. 3, July, 1950, p. 369, is made to conform with the original spelling.
264. *Locustella ochotensis* becomes *Locustella ochotensis ochotensis*, through recognition of extralimital subspecies, and from examination of the specimen from Nunivak. See Wetmore, Condor, vol. 53, no. 4, July 26, 1951, p. 206.
267. *Prunella montanella* becomes *Prunella montanella badia* Portenko, from examination of the specimen from Nunivak Island. Wetmore, Condor, vol. 53, no. 4, July 26, 1951, p. 206.
- Prunella montanella badia* Portenko, SIBERIAN MOUNTAIN ACCENTOR, Compt. Rend. Acad. Sci. U. S. S. R., May, 1929, A, no. 9, p. 220. (Tschuktschenland = Chokotski Peninsula, northeastern Siberia.)
268. *Molacilla flava alascensis* (Ridgway), 1903, becomes *Molacilla flava tschutschensis* Gmelin, 1789, from *Molacilla tschutschensis* Gmelin, Syst. Nat., vol. 1, pt. 2, 1789, p. 962. (ad littora Tschutschi = at sea, in Bering Strait, off the Chokotski Peninsula, Siberia.) See Stresemann, Ibis, vol. 91, no. 2, April, 1949, pp. 251, 255.
297. *Chamaethlypis poliocephala poliocephala* becomes *Chamaethlypis poliocephala ralphi* (Ridgway), from *Geothlypis poliocephala ralphi* Ridgway, Proc. U. S. Natl. Mus., vol. 16, February 5, 1894, p. 692. (Brownsville, Texas.) See Wetmore, Proc. U. S. Natl. Mus., vol. 93, May 25, 1943, p. 316; *idem*, vol. 95, July 7, 1944, p. 72.
332. The name *Pipilo fuscus wrangeli* (Bonaparte), accepted in the Twenty-third Supplement, Auk, vol. 65, no. 3, July, 1948, p. 443, is found on further study to be of uncertain reference. The form will be known again as *Pipilo*

- fuscus petulans* Grinnell and Swarth. See Davis, Univ. Calif. Publ. Zool., vol. 52, no. 1, October 30, 1951, pp. 27-30, 103-105.
332. *Pipilo fuscus mesatus* Oberholser, COLORADO BROWN TOWHEE, Proc. Biol. Soc. Washington, vol. 50, August 7, 1937, p. 118. (Gaume's Ranch, elevation 4600 feet, northwestern corner of Baca County, Colorado.) Additional subspecies. Southeastern Colorado to northeastern New Mexico and northwestern Oklahoma. See Davis, Univ. Calif. Publ. Zool., vol. 52, no. 1, October 30, 1951, pp. 62-63, 107.
352. *Zonotrichia coronata* (Pallas), 1811, becomes *Zonotrichia atricapilla* (Gmelin), 1789, from *Emberiza atricapilla* Gmelin, Syst. Nat., vol. 1, pt. 2, 1789, p. 875. (in Sinu Natka, et insulis Sandwich = Prince William Sound, Alaska.) See Stresemann, Ibis, vol. 91, no. 2, April, 1949, pp. 249, 255.
356. *Melospiza georgiana nigrescens* Bond and Stewart. COASTAL PLAIN SWAMP SPARROW. (584b.) *Melospiza georgiana nigrescens* Bond and Stewart, Wilson Bull., vol. 63, no. 1, March, 1951, p. 38. (Nanticoke River Marshes, Wicomico County, opposite Vienna, Maryland.) Additional subspecies. Coastal plain of eastern Maryland and Delaware.
358. *Melospiza melodia maxima* Gabrielson and Lincoln. GIANT SONG SPARROW. [581cc.] *Melospiza melodia maxima* Gabrielson and Lincoln, Condor, vol. 53, no. 5, September 26, 1951, p. 251. (Kiska Harbor, Kiska Island, Aleutian Islands, Alaska.) Additional subspecies. From Atka to Attu, western Aleutian Islands, Alaska.
358. *Melospiza melodia amaka* Gabrielson and Lincoln. AMAK SONG SPARROW. [581dd.] *Melospiza melodia amaka* Gabrielson and Lincoln, Condor, vol. 53, no. 5, September 26, 1951, p. 253. (Amak Island, north of the western end of the Alaska Peninsula, Alaska.) Additional subspecies. Amak Island. Bering Sea, Alaska.

#### GENERAL NOTES

**Sex Displays of the Slate-colored Junco, *Junco hyemalis*.**—During a study of the winter behavior of a flock of Slate-colored Juncos in 1947 the writer was surprised, at the height of the spring migrant invasion, by the sudden appearance of varied and striking courtship patterns in the birds' behavior. Such premature displays were not seen, however, the following year nor in two subsequent studies of the Oregon Junco, *Junco oregonus*, in the Great Basin and the Puget Sound areas. Hence they may have been rare happenings. The observations here recorded were made in Ithaca, New York, April 19–22, 1947, in 22.5 hours. Methods of observation are described elsewhere (Physiol. Zool., 22: 64–85, 1949) but two features should be mentioned. The winter residents were marked with colored feathers and were individually distinguishable from each other, as well as from the unmarked migrants. The displays were watched from a point six to ten feet from the birds. During April attendance at the observation station had naturally slackened, but a revival was brought about by a heavy snowfall on April 19. Four marked winter residents (of a total of 15) and unmarked birds up to 14 at a time were the participants. The Slate-colored Junco is not obviously sexually dimorphic externally. In the coloration of head and hood, individuals range from light gray to nearly black. Males are more frequently dark but they may be light, and females are sometimes dark.

There were five types of sex behavior: 1) A winter resident, WL, began suddenly to make drives of six to eight feet at every junco attempting to eat at the station with the exception of RC, a bird dominant to WL. If RC came to the station, WL left immediately. These long persistent drives, which were to the detriment of WL's opportunities to eat, and the unusual avoidance of RC showed a degree of intolerance of the proximity of other members of the species which is unknown in the winter flock. WL's behavior was identical with that of the male Oregon Junco when actually establishing his breeding territory. After a day and a half, WL lapsed into normal winter behavior; 2) One bird, always pursued by another, would fly into the lower branches of a tree, go up over one branch and down under another. During the downward sweep of this undulatory flight the white underparts and tail feathers were flashingly shown; 3) One little ceremony had an air of great "politeness." A bird would hop gently up to another and when about a foot away would make a deep bow. The other would respond in kind, and something like four to eight bows would be exchanged. The two would then separate with the appearance of having lost interest; 4) Two birds would face each other and stretch up into the most erect posture possible, with folded wings, fanned tails seeming to touch the ground, and open bills opposite and about an inch apart. Trilling and rigidly maintaining this posture, they would then execute swiftly, precisely, and in unison a series of vertical head thrusts up and down during which the bills were kept exactly opposite. These head dances probably lasted less than two seconds and the vertical movements appeared to cover a distance of one and a half to two inches. This detailed description is based on many observations during which the observer's attention was focused successively on different parts of the display. In this head dance the birds elongated and shortened the neck with a speed, exactitude, and synchronization which looked machine-like. Occasionally, instead of separating after the head dance, the two described an arc, somehow flying sidewise and maintaining their close-facing position, alighted about four feet away, and repeated the dance; 5) One pair of birds prefaced the head dance with a sequence seen only once. The

style of this sequence can hardly be described otherwise than by the word "romantic." RC, a large and very black bird and therefore probably a male, was perched in the cedar hedge overlooking the feeding bench about two feet below, where a second bird was feeding. Suddenly the latter darted to the hedge and crept up with extreme slowness from twig to twig, meanwhile reaching up toward the perching bird. RC kept its footing but slowly bent far down, likewise reaching toward the other. Finally their bills were about two inches apart. Then, as though at a signal, they sprang erect and opposite in the hedge, executed the head dance, the arc flight, and the second head dance, and disappeared after going through the undulating flight. RC was the pursuer in this flight.

These routines also occurred in a fragmentary way or in the form of a display by one bird to which the other did not respond. Sex recognition did not seem to be involved in these reactions, since there was no display which elicited different responses on different occasions. A curious fact was that some of the ordinary patterns of winter behavior seemed to become stylized. The pecks by which a junco shows its intolerance of a subordinate were not affected, but fights and threat postures altered their appearance in the direction of rigidity and preciseness. The regular junco fight is ritualistic, without pecking or clawing. The birds face each other and each appears to try to rise higher than the other. Usually there is a certain raggedness about this procedure, but the fights during the period under consideration became exact in the facing and the distance apart. In the normal, winter threat-posturing the birds merely draw up more or less tall, but now they were assuming a stiff, erect posture like that at the beginning of the head dance. So stylized had these reactions become that only one factor stood in the way of classifying them as sex rather than dominance reactions; they took place at the feeding bench and had the outcome expected from displays of dominance—that is, one bird stayed and the other left.—WINIFRED S. SABINE, 503 Triphammer Road, Ithaca, New York.

**Nesting of Clay-colored Sparrow, *Spizella pallida*, in Northern Ontario.**—The Clay-Colored Sparrow was first recorded in the District of Algoma in northern Ontario in 1931 by a party from the Royal Ontario Museum. In the spring of 1948, I found the species nesting in the Rankin Location, a rural school section about three miles east of Sault Ste. Marie. The habitat was made up of grassy fields with clusters of willows up to ten feet high and occasional solitary aspens twice that height. It was flooded to a depth of almost a foot by melting snow in spring, but thoroughly dry by mid-June. Sphagnum moss grew beneath the denser stands of willows. My first record of the species from such a field was on May 23. At that time the field was still ankle deep in water. Two more birds were seen five days later, in willows beside a stream, with a stand of aspens at one end of the shrubby border.

In the Rankin Location, I heard this species sing almost daily from May 26 until late in June. At least two males sang from the aspens, always perching above the tops of the willows. The singing birds stood erect, throwing their heads back, and pointing their beaks almost vertically upward.

Two males were singing one evening, permitting a direct comparison of their songs. One sang a series of 41 songs, each consisting of from two to ten buzzes, and averaging six. The three individual songs which consisted of only two buzzes were noticeably flatter in pitch and slower in tempo than the others. Meanwhile, the other male sang only seven songs, noticeably slower and shorter, from two to five buzzes long. At the only nest under close observation, the male sang less and less frequently until the evening before hatching.

Three nests were found, on June 13, 14, and 15. They were from four to 14 inches from the ground, anchored to several almost vertical stems of the willows in which they were built. Number 1, deserted when found, contained one egg. Number 2 was empty when found with no birds near it, but the first egg was laid in it before 8:30 a. m. on June 15. Number 3 contained four eggs, a complete clutch.

At Number 2, I found an adult on the nest every time I visited it during the next few days; three more eggs were laid during this period.

At nest Number 3, each bird of the pair had its own approach route to the nest. Although I was unable to distinguish the sexes of the birds, extensive watching convinced me that each route was used by only one individual. Both routes were about 18 inches in length, consisting of a number of perches which were used in an almost invariable sequence. As incubation progressed these routes became less definite, and by the last day of incubation the birds were often skipping half the usual stops.

Both sexes incubated, but one much more often and for longer periods than the other. The non-incubating bird fed in nearby trees, sometimes in the nest tree itself. Frequently both birds would leave the nest and feed together for five or ten minutes, often eating willow catkins. Changes of place at the nest occurred in silence, the incubating bird leaving the nest as soon as the newcomer entered the nest tree.

At noon, on the sixth day of my watch at nest Number 3, one sparrow approached the nest, "chipping" rapidly. The incubating bird stood beside the nest; the other approached, using neither habitual route; and both stood beside the nest for a few seconds, then left separately. This may have had some connection with the fact that the eggs were within a few hours of hatching.

At nest Number 2, three eggs had hatched by 9 a. m. on June 28, 12 days after the first had been laid. The fourth egg hatched the next morning. One of these eggs had been incubated 10 days at most, and none more than 13 days. One egg in each nest hatched almost exactly 24 hours after the others. The incubation period is apparently 10 or 11 days.

When I flushed the adult sparrow from nest Number 3 at 8:30 a. m. on June 21, I discovered that one of the eggs had hatched. There was no trace of shell in the nest.

Within five minutes, both adults had reappeared in the nest tree. One, probably the male, went to the nest and picked a piece of eggshell from it, "chewing" it for a few seconds. He then flew six feet with it, apparently ate it, wiped his beak, and disappeared. When I approached the nest two or three minutes later, one of the adults was sitting. There were then two eggs and two nestlings, with no remains of the broken shell.

No change had taken place by noon. A slight tapping on the nest at 12 o'clock evoked no response from the young, although at 1:30 p. m. they attempted to beg in response to the same stimulus. One failed in its attempt, slipping from his support against an egg to the bottom of the nest. The other was able to extend his head upward for two or three seconds.

During the intervening period, two attempts were made by the adults to feed the nestlings. In the first case, the food was a light green caterpillar, almost one inch long. It was offered twice, but finally swallowed by the adult which then picked up a two-inch length of dry grass from the bottom of the nest, swallowed an inch of it, and flew away with the remainder projecting from its beak. (This fragment of grass had fallen into the nest while I did some pruning to improve my view of it.) Later, a similar caterpillar was offered to the nestlings at least 14 times before being dropped beside the nest.

By that evening, the young birds could receive food from their parents. Both sexes fed the young. The two original routes of approach were now neglected, and a new one, less well defined, was beginning to be used.

A Marsh Hawk, *Circus cyaneus*, flew over the nest that evening as one of the sparrows was about to feed the nestlings. Immediately the sparrow crouched and froze, uttering three thin calls resembling the syllable 'eek.' When the hawk had passed, feeding was resumed.

A third egg had hatched the next morning before 8:30, but I was unable to spend much time at the nest that day. The fourth egg failed to hatch but was allowed to remain in the nest until finally destroyed.

Most of the food brought to the nest was small green caterpillars. However, on the third day after the beginning of hatching, a few large, dark caterpillars were brought. The first of these was offered unsuccessfully and finally eaten by the adult sparrow, but an hour later a similar caterpillar was eaten by a nestling.

Until the older nestlings were three days old, their excreta were eaten by the adult birds. However, after that time it was carried beyond my sphere of observation. By that time, the nestlings were able to maintain a begging position for a nearly a minute. The two-day-old bird held his neck fairly rigidly extended upward, but the two older nestlings swayed their heads through a small arc from front to rear, like an inverted pendulum. All were still blind.

Late in the afternoon of June 24, an unknown predator destroyed nest Number 3. Since the other was not as advanced, and I had to leave Algoma five days later, I was unable to observe the later stages of nesting.

#### SUMMARY

In the District of Algoma, the Clay-colored Sparrow nests in fields overgrown with willows, with aspens suitable for singing perches, and subject to spring floods. Singing occurs until the end of incubation and shows some individual variation. The nests are built a few inches above the ground in willows. Two complete clutches were of four eggs each. Both sexes incubate for 10 or 11 days; each sex uses a distinct approach route to the nest. In two nests, one egg hatched 24 hours after the others. Both adults fed the young. A new approach route was used by the adults after the eggs had hatched.—FREDERICK E. WARBURTON, *Owen Sound, Ontario, Canada.*

**Definitions for the Analysis of Survival of Nestlings.**—Considerable confusion exists in ornithological literature about the methods of calculating survival of young birds. This confusion results in part from failure to define the survival terms and in part from the problem of altricial birds which, in effect, are "born" twice. This paper attempts to clarify the definitions and gives some examples of their use.

These suggestions omit a discussion of the construction of a conventional life table which is organized to show the number of survivors at successive equal intervals of time. The life table can be easily constructed from data that are systematized according to the recommendations of this note. However, the life table concept is less satisfactory than the following concepts because of the varying duration of the stages of nest-life, monthly variations, and the short lives of most birds.

Mortality rate is commonly used to indicate some sort of a percentage of deaths but is very loosely used. It is suggested that the phrase be omitted to prevent confusion, since there are the following two kinds of mortality rate.

A. The probability of dying ( $q$ ) is the fraction of the initial population dead at time  $t$ . For example, if 100 birds are alive on January 1 and 60 of these birds have

died by December 31, the annual probability of dying is 60/100 or 0.6. The probability of dying cannot be more than one (certainty).

B. The death rate ( $r$ ) is the number that die divided by the average population during the period of time. Thus if a population of birds declines exponentially, as a result of 60 deaths, from 100 to 40 during the year the average population is 65.5 and the death rate is  $60/65.5 = 0.915$ . But if, although there were 60 deaths, the population remains stationary at 100 birds, then the death rate is 60/100 or 0.6. It must be noted that the death rate can be more than one in species that have short lives and high natality rates. It is possible to have 300 birds die in a population that averaged 100 birds, giving a death rate of 300/100 or 3.0.

The probability of dying ( $q$ ) is related to the probability of survival ( $p$ ) by the following equation,  $q = 1 - p$ . Ornithological work is usually described in terms of survival and hence survival will be used from now on.

The probability of survival ( $p$ ) is related to the death rate ( $r$ ) by the following equation:

$$p = e^{-r} \text{ whence, } e^r = 1/p \text{ and } r = \log_e (1/p)$$

In addition to the above definitions it is necessary to obtain definitions of the ornithological aspects. For birds it is probably best to omit the calculations of death rates because they imply a constant reproductive rate. Furthermore, the probability calculations are usually adequate. The annual probability values rarely reach one, due to the relation between length of life and reproductive rate. If desired, the death rates can be readily calculated. The following definitions are proposed for the ornithological aspects.

1a. The probability that eggs will hatch is the number of eggs hatched divided by the number laid.

1b. The probability that eggs in successful nests will hatch is the number of eggs that hatch divided by the number of eggs in nests that were successful (*i. e.*, hatched at least one egg).

2a. The probability that eggs will produce fledglings is the number of young that leave the nest divided by the number of eggs laid. This definition usually can be applied only to altricial birds.

2b. The probability that eggs in successful nests will produce fledglings is the number of young that leave the nest divided by the number of eggs laid in successful nests (*i. e.*, fledged at least one young).

3a. The probability that nestlings will fledge is the number of young that are fledged divided by the number of eggs hatched (nestlings). This definition also usually can be applied only to altricial birds.

3b. The probability that nestlings in successful nests will fledge is the number of young that are fledged divided by the number of eggs hatched in successful nests (*i. e.*, nests that fledged at least one nestling).

4. The probability of survival of young to a specified date is the number alive at that date divided by the number that left the nest, or, in precocial birds, that hatched.

The time interval for the first three definitions is determined by the length of that phase of the life cycle in the particular species. An annual value is biologically meaningless. However, for comparative purposes definition 4 (the probability of survival of young) can be put on an annual basis, if desired, by the formula:

$$p_a = (p_t)^t$$

where  $p_t$  is probability of survival during time  $t$ ,  $p_a$  is annual probability of survival and  $t$  is the number of time units in a year (12 if  $t$  is a month; 52 if  $t$  is a week, etc.).

From these definitions it is clear that  $(p_{1a})(p_{2a}) = p_{3a}$ , where  $p_{1a}$ ,  $p_{2a}$ ,  $p_{3a}$  refer to the probability values obtained for the respective definitions. This provides a simple check on the calculations. But the same reasoning cannot be applied to definitions 1b, 2b, and 3b because "successful nest" does not always mean the same thing.

Strictly speaking, infertile eggs should be excluded in these calculations. However, data on infertility are rare and the proportion of such eggs is small, so that no great error is introduced.

It is also necessary to consider the probabilities for survival of a nest, which means that at least one egg will hatch or one young will fledge from a nest.

5. The probability that some eggs in a nest will hatch is the number of nests in which at least one egg hatched divided by the total number of nests with a full clutch.

6. The probability that some fledglings will leave a nest is the number of nests from which at least one young was fledged divided by the number of nests with a full clutch. Obviously this does not apply to precocial birds.

7. The probability that some fledglings will leave a nest in which some eggs hatched is the number of nests from which at least one young was fledged divided by the number of nests that hatched eggs.

Note that, since  $(p_1)(p_2) = p_3$ , a convenient check is available.

It will be noted that in most cases these probabilities are the same as the percentages regularly calculated. The concept of probabilities is suggested because it is a prediction and because it can be more easily manipulated mathematically.

The significance of a difference in probabilities for two species or for the same species in different places or years can be calculated by the usual method as follows:

$$\frac{p_1 - p_2}{\sqrt{pq \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}} \text{ must be more than two to be significant at the five per cent}$$

level of confidence or more than three to be significant at the one per cent level. In the above formula  $p_1$  is the probability for one sample and  $n_1$  is the number of individuals in the sample. The same notations refer to values for  $y$ .  $p$  is the total probability of survival in both samples and  $q = 1 - p$ . This formula assumes that the deaths are independent which is probably rarely true in nature, and hence it gives only an approximation. If the significance is in doubt, more complex methods are required and the data must be recorded according to the number of clutches with 1, 2, 3, etc., eggs and the number of eggs lost for each clutch-size. An indication of the significance of the difference of two samples may be obtained by a consideration of the results of analysis of definition 7.

It is now desirable to cite some examples. The Ruffed Grouse, *Bonasa umbellus*, (Bump, G., R. W. Darrow, F. C. Edminister, and W. F. Crissey, New York State Cons. Dept., 915 pages, 1947) will be used as an example of a precocial species.

Definition 1b. From table 54 (p. 366) 5156 young hatched from 5257 fertile eggs, giving a probability of hatching (in successful nests) of 0.981.

Definition 5. From table 35 (p. 311) 878 of 1431 nests were successful, giving a probability of 0.614 that some eggs in a nest will hatch.

Definition 1a. The data can be utilized from tables 50 and 35 to get a value for this statistic. From table 50, we would expect 100 nests to have 1150 eggs. Total destruction of 49 of these nests (see definition 5) would destroy about 564 eggs. Partial destruction of 0.02 eggs (see definition 1b) in the remaining 51 nests would remove 12 eggs. Hence, the probability of hatching would be  $1 - 576/1150 = 0.499$ .

Definition 4. The survival of young grouse is given in table 81 as 0.368. The unit of time is not specified, but if we assume that the interval is from April 1 to August 1 (4 months) then:

$$p_a = (0.368)^4 = 0.0000549.$$

For an altricial bird it is possible to calculate all the statistics defined above. The studies of Nice (Trans. Linn. Soc. N. Y., 4: 1-227, 1937) provide adequate data in her table 16, page 141.

Definition 1a. A total of 510 eggs hatched from 854 eggs laid. Hence, the probability of hatching is 0.597.

Definition 1b. Of a calculated total of eggs in successful nests of 588 (147 times 4), 510 hatched, giving a probability of hatching in successful nests of 0.867. Infertile eggs are included here.

Definition 2a. A total of 306 young were fledged from 854 eggs. The probability that eggs will produce fledglings is therefore 0.358.

Definition 2b. Since 306 young were fledged from 588 eggs (147 times 4.0) in successful nests, the probability of fledging in successful nests is 0.520.

Definition 3a. A total of 306 young were fledged from 510 eggs that hatched. The probability of young fledging is therefore 0.600.

Definition 3b. The data are not given directly in table 16 but can be calculated as follows. Eggs hatched in 147 nests and young were fledged in 100 nests, giving 0.68 successful in fledging young. Then, 0.68 times 510 eggs that hatched gives the number of eggs (347) that hatched in nests that successfully fledged young. The probability of nestlings fledging in successful nests is  $306/347 = 0.882$ .

Definition 4. Data are not available for this statistic, but we can calculate the "probability of returning" as follows. From table 26 (p. 180) 40 birds returned from 317 banded as fledglings. If we assume that the mean date of fledging was about June 15 (see table 12, p. 132) and that the mean date of return was about March 15 see chart 6, p. 44) then the "probability of return" is  $40/317 = 0.126$  for 9/12 of a year. The annual probability, therefore, is 0.126 raised to the 12/9 power, which is 0.0632

Definition 5. The probability of a nest successfully hatching is 0.697, since eggs hatched in 147 of 211 nests.

Definition 6. The probability of a nest successfully producing young is 0.474, since 100 of 211 nests produced young.

Definition 7. The probability of a nest, in which young hatched, producing young is 0.680, since 100 nests produced young out of 147 nests in which young hatched.

For comparison the results may be tabulated as follows:

Definition (see text)	Song Sparrow (Nice)	Ruffed Grouse (Bump et al.)
1. a.	0.597	0.499
b.	0.867	0.981
2. a.	0.358	—
b.	0.520	—
3. a.	0.600	—
b.	0.882	—
4.	0.0632	0.0000549
5.	0.697	0.614
6.	0.474	—
7.	0.680	—

It may be worthwhile to calculate the significance of a difference. Nice (*op. cit.*, p. 141) states that the probability of fledging was far less in 1933 than in 1932. In 1933, 27 (19.0%) of 142 eggs fledged; in 1932, 76 (35.8%) of 206 eggs fledged. Utilizing the formula given above the calculations are:

$$\frac{.368 - .190}{\sqrt{(.296) (.704) \left( \frac{1}{206} + \frac{1}{142} \right)}} = \frac{.178}{\sqrt{.00232}} = 3.8$$

This result is statistically significant, if we can assume that the deaths are independent. If, however, most of the deaths are dependent, then the difference probably is not significant and needs further analysis.

It is hoped that this systematization of data will permit more uniformity of analysis and stimulate the collection of more adequate data.

I am indebted to D. F. Farner, R. V. Rider, and C. A. Bachrach for criticism of the manuscript at various phases of its development.—DAVID E. DAVIS, *Division of Vertebrate Ecology, Johns Hopkins School of Hygiene and Public Health, Baltimore, Maryland.*

**Notes on Birds of Jamaica.**—This note concerns some observations made in the winter of 1946-47 on transient or winter visitant birds of Jamaica. I wish to point out that I made my records available to James Bond, of the Philadelphia Academy of Natural Sciences, for use in his 'Field Guide to Birds of the West Indies' (1947) and his 'Check-list of Birds of the West Indies' (1950). Thus, it will be noted that all species here recorded as new to the Jamaican avifauna have already been listed by Bond for the island. However, lack of space prevented Bond from giving details of the records here presented.

For aid in many ways I am indebted to Mr. Bond, to Mr. C. Bernard Lewis, Curator of the Science Museum of the Institute of Jamaica, Kingston, to Dr. Bernard Williams of Greenwood, Salt Marsh P. O., Jamaica, to the Hon. Theodore R. Williams of Kew Park, Westmoreland Parish, Jamaica, and to many other Jamaican friends. Dr. George M. Sutton of the University of Michigan helped me secure some essential supplies. I also owe my thanks to Mr. Lewis, Dr. Williams, and other members of the Natural History Society of Jamaica for permitting me to publish here some of their notes from the Society's mimeographed 'Natural History Notes' (see literature cited).

All specimens taken are in the collection of the Science Museum of the Institute of Jamaica.

*Plegadis falcinellus*, GLOSSY IBIS, and *Guara alba*, WHITE IBIS.—I saw two Glossy Ibises and two flocks of about 12 birds each of White Ibises on November 29, 1946, in the Dawkin's pond area, Port Henderson, St. Catherine Parish. May Jeffrey-Smith (1947: 116) reports 15 White Ibises at the mouth of the Martha Brae River, Trelawney Parish, on June 22, 1947. C. B. Lewis (1948: 142) reports an unverified observation of "dozens of Glossy Ibis and a lesser number of White Ibis . . . feeding at the mouth of the Duhaney River." Bond (1950: 12-13) gives no other Jamaican records for the Glossy Ibis. Concerning the White Ibis, he writes (*loc. cit.*) "apparently rare in Jamaica, though formerly a not uncommon resident." Jamaican observers would do well to obtain specimens to serve as concrete evidence of the present day occurrence of these two ibises on the island.

*Coccyzus erythrophthalmus*, BLACK-BILLED CUCKOO.—According to Bond (1950: 71) this cuckoo is casual in the West Indies on migration, being recorded from Cuba,

the Isle of Pines, Jamaica, Puerto Rico, and Dominica. The single Jamaican specimen was shot by Dr. Williams at Greenwood, near Salt Marsh, St. James Parish, in September, 1946. I examined the specimen while collecting at Greenwood. Dr. Williams also reports (1949b: 56) seeing two Black-billed Cuckoos at Greenwood on July 24, 1949. It would be desirable to have specimens substantiating this unusual summer record.

*Contopus richardsonii richardsonii*, WESTERN WOOD PEWEE.—An immature male (HBT 166) which I took on October 10, 1946, constitutes the only West Indian record of this western North American pewee (Bond, 1950: 100-101). It was taken near the margin of a mangrove swamp at the edge of Portland Ridge, a hilly limestone point in Clarendon Parish, on the hot, dry southern coast.

The Eastern Wood Pewee, *Contopus virens*, has yet to be recorded from Jamaica, although it has occurred rarely in migration on Cuba and several small islands of the western Caribbean (Bond, 1950: 100).

*Dumetella carolinensis*, CATBIRD.—Bond (1950: 115-116) lists the Catbird as "rare in Jamaica." The only records known to me are listed below. On February 17, 1947, I saw a Catbird which I failed to obtain at Greenwood, St. James Parish. The following day I shot a female (HBT 346) approximately 1000 yards from the thicket in which I saw the first bird. Both birds (if different individuals were involved) responded to "squeaking." Had they not thus responded they would have gone unnoticed, since they were in dense thickets. Dr. Williams (1949a: 17) records "two [Catbirds] seen and heard calling at Greenwood on 18th February [1949, that] came to squeaking." Catbirds are common on Cuba, the Isle of Pines, and the Cayman Islands in winter (Bond, *loc. cit.*). Probably they are more numerous and regular in Jamaica (at least along the north coast) at this season than the records given here indicate.

*Limnothlypis swainsonii*, SWAINSON'S WARBLER.—Ludlow Griscom (1945: 109), in commenting on the winter range of this species, writes, "Among the earliest records for this bird were winter records from Cuba and Jamaica, now nearly one hundred years old. It was naturally supposed to winter in the West Indies. As a matter of fact it has never been seen or heard of again there . . . . It is consequently possible that it is a mere straggler to the West Indies, and that its real winter quarters are in southern Mexico." Bond (1950: 133) corrects this supposition by referring briefly to my winter records of Swainson's Warbler, which are given here in greater detail. I collected three female Swainson's Warblers in the winter of 1946-47 (December 31, HBT 274; February 5, HBT 323; February 7, HBT 329) within 15 miles of Kingston. In addition, I saw at least nine others between December 31 and February 7. On two occasions I saw three in one day. My observations indicate that this warbler winters in Jamaica in fair numbers. Six of the individuals that I saw were in dry lowland woods; the rest were in damp forests in the hills north of Kingston (at Hermitage, St. Andrew Parish).

*Helmitheros vermivorus*, WORM-EATING WARBLER.—Bond (1950: 134) lists this species as a rare winter resident in the Greater Antilles. In view of this, it seems worthwhile to record that I saw seven individuals, three of which I collected (two males, one female), at various localities in the wooded hills near the southern coastal plain. The westernmost locality was Chapelton, Clarendon Parish; the easternmost was 14.5 miles east of Kingston along the Morant Bay Road, St. Thomas Parish. Dates were December 23, 1946, January 21, January 24, and February 2, 1947.

*Dendroica magnolia*, MAGNOLIA WARBLER.—The first Jamaican record of this species is of a male (HBT 352) which I took February 25, 1947, at Kew Park, West-

moreland Parish. Since that time, Dr. Williams has observed Magnolia Warblers on February 15 and 18, 1949, at Greenwood, St. James Parish (Williams, 1949a: 17). R. G. Taylor (1949: 56) has reported another individual seen on November 8, 1948, in St. Andrew Parish, near Kingston.

*Dendroica virens*, BLACK-THROATED GREEN WARBLER.—A male (HBT 333) which I obtained on February 12, 1947, at Greenwood, St. James Parish, seems worthy of note since this species, although previously recorded, is rare in Jamaica.

*Passerina cyanea*, INDIGO BUNTING.—A female (HBT 340) which I took on February 15, 1947, at Greenwood, St. James Parish, is the first Indigo Bunting taken in Jamaica. Dr. Williams told me he had seen a male Indigo Bunting near Kingston in March, 1946. No other Jamaican records of this species have come to my attention.

#### LITERATURE CITED

- BOND, JAMES. 1947. Field guide to birds of the West Indies. (Macmillan Co., N. Y.), ix + 257 pp.  
BOND, JAMES. 1950. Check-list of birds of the West Indies. (Phil. Acad. Nat. Sci.), xiii + 200 pp.  
GRISCOM, LUDLOW. 1945. Modern bird study. (Harvard Univ. Press, Cambridge), x + 190 pp.  
JEFFREY-SMITH, May. 1947. Nat. Hist. Notes Nat. Hist. Soc. Jamaica, No. 31: 116 (mimeo.).  
LEWIS, C. B. 1948. Nat. Hist. Notes Nat. Hist. Soc. Jamaica, No. 32: 142 (mimeo.).  
TAYLOR, R. G. 1949. Nat. Hist. Notes Nat. Hist. Soc. Jamaica, No. 39: 56 (mimeo.).  
WILLIAMS, B. W. 1949a and 1949b. Nat. Hist. Notes Nat. Hist. Soc. Jamaica, No. 37: 17 and No. 39: 56 (mimeo.).

—HARRISON B. TORDOFF, *Museum of Natural History, University of Kansas, Lawrence, Kansas.*

#### NOTES AND NEWS

AN important advance in the study of bird migration in America was marked by the appearance last year of George H. Lowery's 'A Quantitative Study of the Nocturnal Migration of Birds' (Univ. Kansas Publ., Mus. Nat. Hist., 3 (2): 361-472). This paper presents a technique for measuring the comparative volumes of migration at different times and places by counting the birds passing before the disc of the moon through a small telescope. Applying this technique, Lowery discovered that the nightly flights of migrants in spring follow a surprising time pattern, typically increasing in intensity until the hour before midnight and subsiding to near-zero in the hour before dawn. He also found evidence that nocturnal migration, unlike diurnal migration, is characterized locally by a remarkably uniform dispersal of birds in the sky; that heavy migrations in the air are not likely to produce heavy densities of migrants on the ground, unless concentrative factors come into play; and that the movement of birds at night is profoundly affected by the movement of air masses.

These conclusions were made possible by observations gathered in the spring of 1948 at 30 stations on the North American continent by over 200 ornithologists and astronomers. An even wider coverage could have been arranged, had it not been for the difficulty at that time of processing data in large numbers. Since then, the

development of new mathematical approaches has largely removed this difficulty, and it has become possible to deal with observations in the vast quantities that most problems in migration require. A second cooperative effort, on a still larger scale, is scheduled for the fall of 1952. If you have access to a small telescope, your help is urgently needed, whether you have only a couple of hours to devote to the project, or several nights. The mathematical reductions of your data will be performed at the Louisiana State University Museum of Zoology. You will be furnished with a summary expressing your observations in terms of the number of birds per hour per mile of front for each directional sector. The broader aspects of this information will be integrated with information from other stations as the basis for a report on fall migration in America. You, however, are invited to make any use you choose of the computations furnished by the University. Nothing would please the sponsors of the project more than to have observers prepare papers of their own on local aspects of nocturnal migration.

Interested persons should get in touch immediately with Robert J. Newman at the Museum of Zoology, Louisiana State University, Baton Rouge, La. The details of the observational procedure, which is an extremely simple one, will be promptly forwarded, together with specific suggestions regarding the many local problems to which the telescopic method can be profitably applied.

---

At the next meeting of the International Congress of Zoology at Copenhagen in early August, 1953, the International Commission on Zoological Nomenclature will propose several changes of and additions to the Rules. These deal particularly with the following points: Emendation of zoological names (356), the naming of families (357), the naming of orders and higher taxonomic categories (360), the status of *nomina nuda* published in synonymy (387), the validity of types designated in connection with the proposal of a substitute name for a previously published name (361), the selection of neotypes (358), and "means to be devised for securing stability in zoological nomenclature" (359). Further details on these points have been published in Volume 7 of the Bulletin of Zoological Nomenclature. All zoologists who want to submit comments on these matters to the Commission should address them to the Secretary of the Commission, Mr. Francis Hemming, 28 Park Village East, Regent's Park, London, N. W. 1, England. All communications should be marked with the reference numbers cited above in parentheses; they must reach the Secretary before July 31, 1952.

---

The Aves section of the 'Zoological Record' (Volume 87, containing the literature for 1950) has been published and is available to subscribers.

## RECENT LITERATURE

**Nature Sanctuaries in the United States and Canada, a Preliminary Inventory.** S. Charles Kendeigh *et al.* *Living Wilderness*, 15 (35): 1-45. Winter, 1950-51. \$0.50.—An entire issue of the quarterly magazine published by the Wilderness Society (1840 Mintwood Place, Washington 9, D. C.) is devoted to this list of 691 nature sanctuaries in the United States, Canada, and Alaska. It is the fruit of long labor, spanning 12 years, by the Committee on the Study of Plant and Animal Communities and principally by its chairman, Dr. S. Charles Kendeigh of the University of Illinois. The objective was to compile a working list of sanctuaries, describe them briefly, and evaluate their suitability for scientific study, the measuring stick being one of degrees of disturbance and the principle being that the less disturbed an area is, the better it is for research (at least in the particular line of community research emphasized by the committee). Numerous persons have cooperated in the compiling job, including over 200 contributors beside the committee of 16 ecologists representing the Ecological Society of America and later the Ecologists' Union (now called the Nature Conservancy). This is actually a second listing, the first having appeared in 1926 in the 'Naturalists' Guide to the Americas,' edited by V. E. Shelford.

Included in the listing are national parks, national monuments, many state parks, some county, city, and private parks, and some university-owned study areas. Areas not listed, with some exceptions in each group, are national and state forests, federal wildlife refuges, and protected watersheds. The list is subdivided according to the major biotic regions or biomes, and the sanctuaries are classified according to the type of terrain and climax vegetation which prevail in them. The classification of natural regions used is that in the text 'Plant Ecology' by Weaver and Clements, modified to harmonize with the views of community ecologists at the University of Illinois. Under each biome heading, subordinate headings of associations are used wherever possible, and then sanctuaries are listed by states, subdivided into those protected and those only partially protected.

This system has the obvious advantage of listing sanctuaries with more or less common ecological characteristics under one heading, thus serving as something of an index to conservationists' accomplishments in setting aside samples of each regional community type. One disadvantage is that, at some points, the rigidity and incompleteness of the Clementsian community classification results in some obscuring, if not misleading, features in the placement of sanctuaries. For example, Clements never saw fit to recognize, on the Pacific coast, broad-sclerophyll forest or redwood border associations, and one cannot tell from this listing what sanctuaries contain stands of these communities except if certain species of trees such as madrone or coast live oak are mentioned. Another disadvantage is that the complex distribution of communities in the West leads to such odd tricks of expediency as placing the chaparral region of California under the coniferous forest biome.

Thirteen maps, biome by biome, show the location of sanctuaries, with symbols to distinguish those protected from those only partially protected. These maps are an excellent feature of the listing. Although the entry of the locations could only be approximate on such small maps, the eye catches spots that are placed a little too approximately, as that for the University of California which is shown (page 32) where Stanford University exists!

The brief introduction brings out many interesting points. "The tundra and the communities of the higher Rockies, Cascades, and Sierra Nevada are relatively better

represented than are other types of communities. The deciduous forest and prairie are the poorest represented." "There are no first-class nature sanctuaries [those with virgin vegetation, large enough to support self-maintaining populations of all native animals] in the deciduous forest, prairie, and at the lower elevations of the Rocky Mountains." However, the natural region with the largest number of listed sanctuaries (360) is the deciduous forest and its ecotones. The special slant of this list, clearly indicated in the introduction, is the suitability and desirability of areas for research on undisturbed communities. This was explicit in the working method of the committee, and the results suit its aim. I would think, however, that the message of this list is greater than is indicated by the introduction, and that the committee could have enlarged its service without much additional effort by simply presenting the results from a broader point of view.

There is a large amount of useful information condensed into this list. It will help to promote a continent-wide perspective of the sanctuary problem. As a preliminary list, it is intended to encourage further accumulation of data. It should be used generally as a working guide by conservationists and ecologists. Dr. Kendeigh is to be congratulated for his leadership in this substantial contribution to conservation effort.—FRANK A. PITELKA.

**The Birds of Michigan.**—Norman A. Wood. Misc. Publ. Mus. Zool. Univ. Michigan No. 75: 1-559, 16 pls., 1 map, August 28, 1951. \$4.00—This volume is devoted exclusively to the subjects of distribution, relative abundance, and migration of the birds of Michigan. There are no accounts of habitats or habits; nor are there descriptions of the birds themselves. Characterizations of habitat would have been useful if they could have been supplied. The other omitted topics are generally covered in other books to which the reader appropriately is referred. The work constitutes an up-to-date check-list for Michigan with migration and local geography, but not ecology, emphasized. A total of 309 species, or 334 species and subspecies, is included, each based on the existence of at least one record specimen; 202 of these forms breed in the state. The total of 334 represents an increase of 24 forms since Barrows' 'Michigan Bird Life' of 1912.

The nomenclature is that of the American Ornithologists' Union Check-list and its published revisions to 1949, and the literature taken into account runs through 1943, the year of Wood's death. The section on literature cited was prepared by Josselyn Van Tyne and much manuscript work and the difficult task of editing a posthumous publication was carried out by him with the assistance of Thomas D. Hinshaw and Arthur E. Staebler. A great deal of credit goes to the editors for the perfection of the work even though it is pointed out by them that it was not possible to revise and unify the style of writing in accord with their highest ideals.

For each kind of bird a brief statement of status and range in the state is given, followed by mention of the first record of occurrence for the state. The value of this latter entry is somewhat dubious for most of the species. The detailed distributional material is grouped according to the four seasons and is further subdivided under each of these for the two main areas of the state, the upper and lower peninsulas. Clearly the stress is on migration and its dates in different parts of the state, as is natural for a northern avifauna in which there are few permanently resident species. Spring records are logically reviewed from south to north and fall records in reverse order. A desirable feature is the distinction made in so far as possible between the normal period of seasonal occurrence and the less significant extreme dates. Citation of actual numbers of individuals reported on specific occasions gives a factual guide to abundance and specific instances of nesting or of the observation

of young document the breeding range. There is not a large amount of taxonomic discussion, although here and there appropriate comments explain the few instances where racial differentiation of species occurs within the state or indicate the impossibility of allocating sight records as to race. In the upper peninsula, especially, certain geographically variable species are represented by western or plains subspecies or are there intergradient toward these forms.

The 16 plates are black and white reproductions of photographs of 18 species and their nests. They are generally good illustrations, some of them very good.

The value of this book lies in its mass of carefully assembled, well documented records. The material has been sifted for dependability, and conclusions from the data are not overdrawn. This aspect of soundness should be fully appreciated. If one is inclined on first handling the book to react unfavorably to the heavy loading with detail and to the lack of synthesis which makes it unattractive for general reading, he would do well to realize that its uses are primarily as a source book. Considering it in this way, the reviewer as a comparative novice in the study of Michigan bird life, recently found the book distinctly helpful in visiting that state. True, it would have been possible for Norman Wood to have effected more selection and generalization within each species account, but no one but an author could properly have carried this out.—ALDEN H. MILLER.

**Review of the Alaudidae.** R. Meinertzhagen. Proc. Zool. Soc. London, 121 (1): 81-132, 6 text-figs, 1951.—Col. Meinertzhagen's critical revision of the larks is based not only on considerable amounts of material but also on field acquaintance with all the genera, most of the species, and a large proportion of the subspecies of larks covered in the review. It is an important paper and one worth careful study. Throughout, the author has been guided by five personal concepts: (a) adequate samples of population; (b) habits rank equally with morphological characters; (c) type specimens may be misleading; (d) plumage patterns more important than color differences; and (e) all doubtful allopatric populations should be treated as subspecies. It is doubtful whether most ornithologists would agree to all five of the foregoing concepts. Of course "a" is a basic requirement, "c" under certain conditions must be given due weight, "b," "d," and "e" require careful consideration in individual cases and should not be applied in a rule-of-thumb fashion.

Col. Meinertzhagen's field experience enables him to give a generic diagnosis which includes not only the morphological characters, on which such diagnoses are commonly based, but also the less tangible traits such as habits and habitat, nest, eggs, song, territory, gait, roosting, flocking, food, etc. Text-figures 2, 3, and 4 are ingeniously contrived to show bill form in the different members of the genera *Calandrella*, *Certhilauda*, and *Ammomanes*, respectively.

As might be expected from the author's original approach to the problem, there are many departures from the treatment hitherto accorded many genera and species; in some of these he is undoubtedly right; in other cases differences of opinion could exist; in still others he must expect numerous objections.

There will probably be little quarrel with Meinertzhagen's action in merging *Spisocorys* and *Rasocorys* with *Calandrella*, or *Spizalauda* and *Heliocorys* with *Galerida*, but uniting *Lullula* with *Alauda* is certain to provoke an outcry, and quite justifiably so. Perhaps the most controversial cases will prove to center about *Certhilauda* with which he has united, among others, *Alaemon*, *Chersomanes*, and *Chersophilus*. Here, it seems to the reviewer, that too free application of concepts "b" and "d" results in species of similar habits being placed in a single genus, although they are probably not very closely related. Another troublesome factor

associated with the Alaudidae is the close association between plumage color and the color and character of the soil on which the bird lives, especially in the genus *Ammomanes*, to some extent in "*Certhilauda*" and *Galerida*, and to a lesser degree in some of the other genera. In *Ammomanes deserti* the correlation "between soil color and plumage appears to be absolute, with the result that we find a confused patchwork distribution of almost every described race which involves birds of identical color being found sometimes a thousand miles apart and separated by several other races of completely different tint" (p. 113). Just how such situations can be adequately handled under our system of trinomial nomenclature is a problem. Meinertzhagen recognizes most of the described races of this species; the distribution assigned in many cases is patchy, but it seems to me that this is all that can be done at present.

There are two cases where it seems that the author has gone too far in his lumping of subspecies, granted that the species was probably oversplit to begin with. *Galerida cristata altirostris* Brehm was described in 1855 from near Dongola in the Nile Valley. Of this race Meinertzhagen lists as synonyms no less than 16 names that have been proposed for Crested Larks from various regions between northwest Africa and southern Mongolia. Similarly, 11 named forms have been synonymized with *Alauda arvensis cantarella* Bonaparte 1841 from central Italy; thus the range of *cantarella* is extended from southern Europe across southwestern Asia to southern Siberia and eastern China. This drastic treatment is explained by statements that "one could not select a single constant sample of population which could not be matched by other samples from other populations" (p. 121) and "no two populations, even micro-populations are identical, especially among ground birds, and among skylarks the breeding birds in a single field show more than minor differences" (p. 129). The author admits color trends and size clines, but feels that either he must recognize all the described forms of both *Galerida cristata* and *Alauda arvensis*, plus naming additional ones, or resort to a policy of lumping.

An enumeration of the specimens of all the forms dealt with throughout the paper would have been of great interest. Unfortunately no idea of the number of specimens handled is given except he states that over 2000 Skylarks were examined. A statistical analysis of such a series should prove illuminating, but such an analysis is clearly beyond the scope of Col. Meinertzhagen's paper.

A concluding addendum describes *Ammomanes deserti faenorum*, a new subspecies (p. 131) from Bahrein Island in the Persian Gulf. [This is antedated by *Ammomanes deserti insularis* Ripley.]

The review of the Alaudidae makes no pretense of being a complete systematic account of the entire family, for the author clearly states in the introduction that the genus *Mirafra* (with which he would include *Pinarocorys* and *Heteromirafra*) has been purposely omitted because he lacks sufficient field experience with that group, and likewise *Eremopterix* and *Eremophila* are not covered because they are "well defined and present no difficulties."—J. L. PETERS.

**A Study of Asiatic Larks.**—Charles Vaurie. Bull. Amer. Mus. Nat. Hist., 97, art. 5: 435–526, 1 pl., 1951. \$1.25.—This is the second important systematic study on the family Alaudidae to appear in 1951. The first, by Col. Meinertzhagen (Proc. Zool. Soc. London, 121: 81–132, 1951) covers the entire family except the genera *Mirafra*, *Eremopterix*, and *Eremophila*, the omission of which was explained. The second, here reviewed, is concerned only with the larks of Asia, and primarily the larks collected by Walter Koelz in Iran, Afghanistan, and India (in the old sense). Dr. Vaurie deals with ten genera in the usually accepted sense, in other words he neither lumps nor splits. He realizes the variability of structural characters and

plumage patterns, but feels that the combination of characters, some of unequal value, distinguish these genera as valid. The ten genera listed in what Dr. Vaurie considers their phylogenetic order are: *Mirastra*, *Eremopterix*, *Ammomanes*, *Alaemon*, *Calandrella*, *Melanocorypha*, *Eremophila*, *Galerida*, *Alauda*, and *Lullula*. It would have been interesting had he stated his reasons for considering *Eremopterix* as "primitive" and why *Lullula* should be placed in the climax position. The species and subspecies accounts are most detailed and painstaking and include lists of material examined, range, specific and subspecific characters, individual variation, measurements, and valuable information on molts. In a number of cases, Dr. Vaurie proves conclusively that two forms hitherto regarded as conspecific actually represent two distinct species: the particular cases in point are *Ammomanes phoenicurus* and *cincturus*, *Calandrella cinerea* and *acutirostris*, and *Alauda arvensis* and *gulgula*.

While for the most part the paper deals with larks in the Koelz collection from Iran, Afghanistan, and India, Dr. Vaurie has revised the skylarks of the genus *Alauda* of all of Asia to show which races belong to *arvensis* and which to *gulgula*. There can be no doubt that the two must be kept specifically distinct since *A. arvensis dulcivox* breeds side by side with *A. gulgula inconspicua* over a large area in Turkestan, although the birds from the Japanese islands (*A. a. japonica*) are somewhat intermediate between the East Siberian races of *arvensis* and the south China races of *gulgula*.

The size of the series of all the forms dealt with is certainly adequate, and in the case of *Alauda* the number of specimens examined was very large, including the series in the American Museum, the British Museum, and some of the examples in Stockholm and Paris.

It is unfortunate that the original references to the first descriptions are not cited; it would seem that in such a paper they should have been. This is particularly true in the revision of *Alauda* where, for instance, one finds "*Alauda arvensis kibortii* Zaleski, 1917 (formerly *intermedia*)" but no reference to the book or journal where the race was first described. A practice which appears to be current among some staff members of the American Museum is the dropping of parentheses about a describer's name when their use is required under the International Rules of Nomenclature, and I regret to see that Dr. Vaurie has followed this practice.

These deficiencies, however, are of a minor nature and in no way detract from the overall usefulness and high standard of painstaking accuracy that characterize 'A study of Asiatic Larks.'—J. L. PETERS.

**Die Entwicklung der Ornithologie von Aristoteles bis zur Gegenwart.** Erwin Stresemann. (F. W. Peters, Berlin), pp. xv + 431, 14 pl., 1951. Price, 30 D. M.—The development of ornithology is treated in three parts: Part I discusses the foundations of ornithology in the period from Aristotle to the Renaissance, and the beginnings of exotic ornithology; Part II the development of systematics and investigations in evolution; and Part III the development of biology.

The great advance in ornithology is emphasized by the fact that the 140 forms known to Aristotle have been increased to about 28,500. This amplification is largely the result of the improvement in the art of preserving specimens. The beautiful skins in the collections of today were preceded by birds preserved in alcohol, or stuffed with tow mixed with tar after removal of the entrails. Klein (1759) was content with the heads and feet preserved in balsam.

Belon (1517-1564), by the use of anatomy, physiology, and biology, placed ornithology on a fundamental basis. His comparison of the skeletons of man and bird

is a classic. The budding science was stimulated by the importation from America of such novelties as the Turkey, *Meleagris*, and Muscovy Duck, *Cairina moschata*. In France especially there was such a passion for foreign birds that, as a result, as late as 1799 Levaillant was to complain that the French did not possess a complete life history of a single native species.

Ornithology could not become a science until a rational system of classification had been devised. A good start was made in Willughby's treatise (1676) under the editorship of Ray. Even today, however, ornithologists of the various countries are not in agreement on the arrangement of orders.

The development of systematics is a very interesting story. The binomials of Linnaeus having been found inadequate, Schlegel (1844) introduced trinomials to provide for his conspecies, or subspecies. American ornithologists, under the leadership of Ridgway (1881), adopted the trinomial for the "nascent species" bearing the impress of "climatic or local influences." When Coues was in England in 1884, leading British zoologists met with him on July 2 to determine if an agreement could be reached on the use of the trinomial system. The discussion was barren of results. A few Germans at this time began timidly to use trinomials, but it was many years before the subspecies concept received general acceptance in Germany and England. This hurdle had scarcely been surmounted when the question arose whether a species could be defined accurately, and if so, whether on the basis of morphology, sterility, biology, or other criteria. Most species have been shown to be polytypic.

As an example of the aid of behavior in taxonomy, the author cites the case of the two warblers, *Phylloscopus collybita* and *P. trochilus*, which were thought to be identical; however, Gilbert White (1768) noted that their songs were entirely different. This is but part of his disclosure, for, at the same time, he pointed out that there were differences in size and in coloration of the tarsi.

The biographies of the leading ornithologists sustain interest. The personalities of these men are as vivid as are their works. Sharpe impetuously hurls an inkstand at an assistant, slow in delivering a reference book, and is equally quick to make amends. The reader is impressed by the author's devotion to ornithology and his warmth of feeling toward his colleagues. Every major contributor to the science receives impartially his due. Along with the histories of Gurney (1921) and Boubier (1925), this book takes high rank.—A. W. SCHORGER.

**Search for the Spiny Babbler: An Adventure in Nepal.**—Dillon Ripley (Houghton Mifflin Co., Boston), pp. xiv + 301, 1952. \$4.00.—This is Dr. Ripley's narrative of his expedition to Nepal in the late fall and winter of 1948-49. Members of the expedition, which was sponsored by the National Geographic Society, Yale University, and the Smithsonian Institution, comprised, besides Dr. Ripley, Edward Migdalski, two recent Yale graduates who served as mammal collectors, and a staff photographer of the National Geographic Society and his assistant.

The little kingdom of Nepal, bordering India on the northeast, embraces part of the Himalaya Mountains including Mt. Everest and other lofty massifs. A beautiful country with some of the most spectacular scenery in the world, it is also one of the most remote. Its geography has served to make it inaccessible and so have its many people who have consistently resisted the intrusion of Americans and Europeans. Nepal has long been a source of fascination for ornithologists. From the researches of a few permitted to enter the country, it has been apparent that a wide variety of birds existed from snow-clad peaks to lowland plain, but information on their exact localities and habitat preferences has been all too fragmentary, making Nepal a sort

of question mark in studies of avian distribution and speciation in Asia. It was Dr. Ripley's principal objective in undertaking the expedition "to range into the back country, in western and eastern Nepal where no collectors had ever been, and try to make a thorough sampling of the avifauna."

The collection brought home from Nepal amounted to some 1,600 specimens of birds and 200 of mammals. Represented in the collection were 331 bird species and subspecies; of these, eight were new to science, having since been described by Dr. Ripley. Among the exciting finds of the expedition were the rediscovery of the Spiny Babbler, *Acanthoptila nipalensis*, and the collecting of about 10 species of Himalayan birds heretofore unrecorded in Nepal.

Here and there in the pages of the book Dr. Ripley indicates some of the ornithological questions that he managed to answer, but the book is primarily a running account of the expedition from beginning to end. The difficulties of gaining access to the country, travelling within, and collecting specimens, the endless details concerned with moving equipment and managing native help, and the countless personal problems involved in just living in the country, let alone getting along with its people, are part of the story. Ornithologists who contemplate their first expeditions will find the book highly instructive.

Dr. Ripley writes most entertainingly, with a light touch and a deft sense of humor. The narrative moves along in a sprightly fashion; though replete with numerous incidents, it is never bogged down by them. Because of the failure of the author to give dates, the reader sometimes loses track of the passage of time and is unable to determine the exact times of year (*i. e.* days of months) when certain points were reached, but this is a small matter. The author's impressions of scenery, wildlife haunts, and certain birds which interested him are vividly described without recourse to wordiness. Some of the most enjoyable parts of the book are those dealing with the official functions in Katmandu, Nepal's capital city. Invariably lavish spectacles wherein the sixteenth-century splendor of both India and China seemed to be combined, they were at the same time incongruously, often amusingly, tainted by twentieth-century "improvements." An unforgettable example was a reception for the American Envoy by the Maharajah and his aides, amid unbelievable pomp, while the band rendered lively strains from Victor Herbert!

Nepal is fast changing, as Dr. Ripley points out. Forests and other wild areas are rapidly disappearing and with them many species of native bird life. Not once during the expedition did members find "a really good collecting place." While a few spots remain relatively untouched by the twentieth century (*e. g.* the charming, well-scrubbed, mountain village of Dhamkuta which has never seen a wheeled vehicle), air travel will soon make Nepal as accessible as other countries of the world.

The book is illustrated by end-paper maps and 18 photographs. A list of recent books published on Nepal and its birds, a general index, and an index of birds conclude the work.—OLIN SEWALL PETTINGILL, JR.

**Mexican Birds. First Impressions.** George M. Sutton. (Univ. Oklahoma Press, Norman), i-xv + 1-282, 16 col. pls., 65 pen and ink drawings. 1951. Price \$10.00.—This book, subtitled "First Impressions" is based upon the author's trip to parts of Nuevo Leon, Coahuila, and Tamaulipas, lasting from the latter part of January until early in March, about six weeks in all. Inasmuch as the bird fauna of Mexico is a very rich one, and one containing many species unfamiliar to the author prior to his short sojourn, it is obvious that the subtitle of his book is very appropriate. This is said, not in criticism of the book, but to explain why it is not more informative than it is. Sutton obviously has the capacity to absorb new experiences

quickly and to enjoy them hugely, and the ability to convey to his reader something of this receptivity, but it seems to the reviewer that much of what he writes is of the stuff of which good conversation is made rather than material calling for preservation on a printed page. After going through the main part of the book (pages 1-186) the reviewer felt that he had gotten not so much a series of impressions of Mexican birds as of the author's enjoyment of his experiences with a new region and a new avifauna.

The appendix, pages 187-257, is described by the publishers on the dust jacket of the book, as a compendium in which, "... all Mexican birds are briefly and concisely described—an indispensable guide for both amateur bird lovers and professional ornithologists." In refuting this claim no criticism is levelled at the author, who makes no such sweeping assertion, but at the unfortunate habit publishers have of claiming too much for their wares. The appendix is by no means complete, and the descriptions in many cases do not promise to be of much real help to anyone travelling in Mexico with this book as a guide. To illustrate—the first page of the list, page 189, covers the tinamous through the pelicans. It mentions, in many cases without descriptions, 17 forms in all. The recent "Check-List of the Birds of Mexico" gives 31 forms of these groups as definitely found in Mexico. In fairness to the author it should be stated that he writes that the, "... book does not pretend to be a complete field guide to, or handbook of, Mexican birds. It would hardly be fair to bird students visiting Mexico for the first time, however, not to mention certain common species which we did not happen to see on this trip; and describing these additional northeastern Mexican forms leads easily and naturally to a consideration of the birds of the rest of the republic." It remains, however, that the appendix is not complete enough in included forms or in adequacy of descriptions to be of much assistance. The reviewer cannot help but feel it is out of place alongside of the first part of the book. The material in the first part would have been better as a small book; putting two quite divergent manuscripts together does not make a better book.

In any book by Sutton one looks first, and, again, last, at the illustrations. The 16 colored plates, representing as many different species, form an attractive and notable series of bird paintings. Of the 16, 12 are sketches presumably made in the field, while 4 are more finished, complete birds. The preponderance of incomplete field studies over finished paintings is in keeping with the tone of the "first impressions" the book is intended to convey. The 65 pen and ink drawings greatly enliven and enhance the text they decorate and illustrate.

It remains to add that the book is handsomely printed, forms an attractive volume, pleasing to the eye, and is adequately indexed.—HERBERT FRIEDMANN.

**The Avifauna of Micronesia, Its Origin, Evolution, and Distribution.** Rollin H. Baker. (Univ. Kansas Publ., Mus. Nat. Hist.), vol. 3 (1): 1-359, 16 text figs. June 12, 1951.—The administration of the Micronesian islands (Carolines, Marianas, Palau, etc.) is now a responsibility of the United States, and the area has thus become of special interest to American ornithologists. Rollin H. Baker's comprehensive account of the avifauna of this part of the Pacific is therefore most welcome. The bulk of the volume (pp. 63-340) is devoted to accounts of the 206 kinds of birds that are known from the islands, based on a careful evaluation of the literature and on the author's own studies in the field and the museum. New taxonomic arrangements of various non-passerine species, particularly terns, are presented.

The first part of the volume (pp. 5-60) is devoted to general questions, such as the geography of the islands (with maps), the history of ornithological exploration,

faunal origins, routes of migration, speciation, and conservation. The detailed analysis of the migration of shorebirds through Micronesia is particularly valuable. A summary and bibliography of more than 300 titles conclude the volume. Taxonomically, the birds of Micronesia are now well-known, but, as Baker says correctly, "the field of avian ecology in Micronesia has barely been scratched." This volume is a sound foundation for further work in this area.—ERNST MAYR.

**A Fish and Wildlife Survey of Guatemala.** George B. Saunders, Ancil D. Holloway, and Charles O. Handley, Jr. Spec. Sci. Rept., Wildl. No. 5 (U. S. Dept. Int., Fish and Wildl. Serv., Wash., D. C.), 1950: 1-162, 3 maps and tables.—This report is based on a mission of the U. S. Government during 1946 and 1947. Actually the report is divided into three sections: 1) game birds and shorebirds of Guatemala (pp. 3-98); 2) recommendations for the development of the fisheries resources of Guatemala (pp. 99-140); and 3) game mammals of Guatemala (pp. 141-162), with extensive bibliographies in each section. The authors regard the stream and lake survey and the fisheries report as of "the most immediate interest" to Guatemala.

The work on birds was prepared chiefly by Dr. Saunders. For his purposes the republic was divided into five wildlife regions: 1) the Pacific Coastal Plain, the finest general area for hunting as long as the forest remains; 2) the Pacific Cordillera with many game birds in what montane forest survives; 3) the Interior Highlands, now badly damaged by a heavy population, agriculture, burning, and soil erosion; 4) Peten Lowlands, still good because of low population and extensive forests; and 5) Caribbean Lowlands, exclusive of Peten, but similar. The game species discussed are primarily tinamous, guans (all genera), quail, and doves.

Particular effort was directed to an inventory of migrating waterfowl present in Guatemala; the only really common species being Pintail, Blue-winged Teal, Lesser Scaup, and Black-bellied Tree Duck. The Pacific Coast showed more birds than did the Caribbean Lowlands. The authors believe that "several million ducks" either winter in or pass through annually on migration, but they were unable to reach the Republic sufficiently early in winter and fall. For their itinerary see pages 17-18. An interesting list of banded birds recovered in Guatemala can be found on pages 14-15.

The report concludes with notes on the game birds and shorebirds of Guatemala (pp. 19-98), giving Guatemalan names, brief descriptions, distribution or status in Guatemala, measurements, and weights. As is well-known, waterfowl and shorebirds are badly "neglected" by collectors, and this report teems with new information about these birds. The Herring Gull and Green-winged Teal are relatively "new" to Guatemala.—LUDLOW GRISCOM.

**Wildlife in Color.** Text by Roger Tory Peterson. (Houghton Mifflin Co., Boston), vi + 191 pp., 453 col. ills., 12 line cuts, 1951. Price, \$3.00.—Each year since 1938 the American Wildlife Federation has published 36 new wildlife paintings as poster stamps. Brought together in this attractive volume, which is sponsored by the Federation, are 453 of the paintings—nearly all that have appeared on the stamps between the years 1939 and 1951. The paintings are reproduced in miniature with approximately the same dimensions as on the stamps. Trees, flowers, insects and other invertebrates, fish, amphibians, reptiles, birds, and mammals inhabiting North America comprise the variety of subjects depicted. Mr. Peterson, confronted with the task of grouping the pictures in a logical manner and preparing a suitable text has chosen the ecological approach.

The text is divided into 12 sections. One is introductory; the others take up different wildlife communities or continental divisions under such titles as "The Deciduous Woodlands," "The Coast and the Sea," "The Desert," and "The West." Each section is headed by one of Mr. Peterson's splendid line drawings showing a representative habitat. Within the sections, groups of trees, flowers, and animals are separately considered under subtitles. Although the subject matter of the text is brief and obviously selected to accompany the pictures, which are usually arranged as marginal illustrations, the author has succeeded admirably in giving the text an overall unity by emphasizing environment and pointing out at every opportunity the urgency of protecting wildlife through realistic conservation practices. Interesting information about each plant or animal is given, the purpose being to provide the reader with facts or ideas that will be easy to remember. One minor error is to be noted; on page 13 the Heath Hen is said to have survived on Martha's Vineyard until 1931, whereas one lone bird was actually seen on the island as late as 1932 (see "The Auk," 49:524, 1932).

Despite the excellence of the text, it is secondary in importance to the full-color illustrations which embellish most of the pages from cover to cover. Represented are the works of 18 artists; most of the bird illustrations are by Mr. Peterson, Walter Weber, and Francis Lee Jaques. In general, the colors are as intense as those on the stamps. While brilliant blues, greens, and yellows seemed appropriate on the stamps, which are intended to be showy, in the illustrations they seem unnecessarily exaggerated, thus giving many of the subjects a quality of unreality. All of the colored illustrations are indexed by common names of the species shown. Accompanying the common names in this index are the technical names together with the initials of the artists who executed the illustrations.

Wildlife in Color, with its abundance of eye-catching pictures, its readable text, and its moderate price, will appeal to a much larger audience than is reached by most books on natural history. As a consequence, a still greater number of people will be introduced to the rich variety of North American plants and animals and will be made to realize the need of safeguarding all wildlife resources through a countrywide conservation program.—OLIN SEWALL PETTINGILL, JR.

ADAMETZ, E. 1951. Eine neue Wildtaubenart für die österreichische Vogelwelt. Carinthia II, Mitt. d. naturwiss. Vereines für Kärnten, 141 (61) Jg. Klagenfurt, 1951: 105-110.—Localities in Austria where *Streptopelia decaocto* was recently recorded.

ALCORN, GORDON D. 1949. Nesting of the Glaucous-winged Gull at Tacoma, Washington. Murrelet, 30 (3): 57.—First authentic nesting in Puget Sound.

ALDRICH, JOHN W. 1951. A review of the races of the Traill's Flycatcher. Wilson Bull., 63 (3): 192-197.—Five subspecies including *Empidonax traillii campestris* new subspecies (Oakes, North Dakota).

AMADON, DEAN 1951. Notes on Chinese Egret, *Egretta culophotes* (Swinhoe). Philippine Journ. Sci., 80 (1): 53-54.—Four specimens from the Philippines.

ARMSTRONG, E. A., AND W. H. THORPE. 1952. "Casting" by Shetland Wren nestlings. Brit. Birds, 45 (3): 98-101.—When young *Troglodytes t. zelandicus* fledged, bits of a brown paste were found under the nest entrance; these were found to consist of chitinous part of insects.

ARVEY, M. DALE. 1951. Phylogeny of the waxwings and allied birds. Univ. Kans. Publ., Mus. Nat. Hist., 3 (3): 473-530, 49 figs., 13 tables.—A North American origin of the Bombycillidae is postulated, and the family is set up with

three subfamilies: 1) Bombycillinae, the waxwings; 2) Dulinae, the palm-chats; and 3) Ptilonotinae, the silky flycatchers. The subfamilies are remarkably similar osteologically, myologically, and in the grosser structures of the digestive tract. Color patterns are unlike, and the Dulinae are thought to have the most nearly ancestral pattern which is recapitulated in the juvenal plumage of the Bombycillinae. The diverse color patterns of the subfamilies are regarded as responses to ecological needs.

While the paucity of skeletons and of birds for dissection probably made impossible significant use of statistics to indicate the probability of some statements in the text, inclusion of at least the ranges of the measurements and the number of specimens measured would have made the paper much more useful. This is particularly true where raw data (the actual measurements) are used to set up additional comparative data (ratios, for example).—H. I. FISHER.

AUMÜLLER, St. 1951. Ergebnisse der Storchbestandaufnahme 1950 im Burgenland. Arb. aus Biol. Station Neusiedlersee, No. 3: 74-87, 2 maps.—Results of investigations in the distribution of *Ciconia alba* in Eastern Austria.

BARNES, J. A. G. 1952. The status of the Lesser Black-backed Gull. Brit. Birds, 45 (1): 3-17.—An enquiry on *Larus fuscus* by the British Trust for Ornithology; a map gives the mid-winter distribution.

BARTH, EDVARD. 1951. Kroppstemperatur hos måkeunger. Body temperature of the young of gulls (*Larus*). Nytt Magazin for Naturvidenskapene, 88: 213-245.—English summary and subtitles to figures and tables. Temperature measurements and experiments show that young gulls are "nonaltricial," but full homiothermy, comparable to that of the adults, is not attained until they can fly. *Larus canus* start flying at 29-33 days, *L. fuscus* at 35-40 days, *L. argentatus* at 37-41 days, and *L. marinus* at 45-50 days. Young birds have greater tolerance to low than to high air temperatures.

BARTHOLOMEW, GEORGE A., AND WILLIAM R. DAWSON. 1952. Body temperatures in nestling Western Gulls. Condor, 54 (1): 58-60.—Cloacal temperature readings taken on more than 60 nestlings of *Larus occidentalis wymani* on Santa Barbara Island, California. The data indicate that some capacity to regulate temperature is present before hatching. Shortly after hatching, in air temperatures between 19 and 28° C., there is little difference in body temperature between newly-hatched and fully-feathered individuals. Between 14 and 18° C., the smaller birds, despite their huddling, have more labile body temperatures than do larger birds.

BAUER, K., AND G. ROKITANSKY. 1951. Die Vögel Österreichs. Teil I. Arb. aus Biol. Station Neusiedlersee, No. 4 (1): 5-45.—A checklist of birds recorded for Austria.

BEARD, ELIZABETH R. 1951. The trachea of the Hooded Merganser. Wilson Bull., 63 (4): 296-301, 1 fig., 2 tables.—Structure of the trachea of *Lophodytes cucullatus* and comparison with the tracheae of related species.

BECK, J. W. 1951. *Megacirrus megapodii* n. g. n. sp., a cestode from the Malayan Brush Turkey, *Megapodius laperouse senex* (Cestoda: Dilepididae). Journ. Parasit., 37 (4): 405-407.—From Palau Islands.

BEECHER, WILLIAM J. 1951. Convergence in the Coerebidae. Wilson Bull., 63 (4): 274-287, 5 figs.—Largely on the basis of jaw muscle-pattern and horny palate relief, the family Coerebidae is considered to be composed of warblers and tanagers convergently adapted for feeding on nectar. The author concludes that the genera now contained in this family should be distributed between the Parulidae and the Thraupidae.—J. T. Tanner.

- BENSON, C. W. 1951. The Lesser Cuckoo *Cuculus poliocephalus poliocephalus* Latham in Nyasaland. *Ibis*, 93 (4): 627-628.—New to Nyasaland.
- BERGER, ANDREW J. 1951. Ten consecutive nests of a Song Sparrow. *Wilson Bull.*, 63 (3): 186-188, 1 table.—Of a female *Melospiza melodia* in three consecutive years, with notes on Cowbird parasitization and nesting success.
- BISWAS, B. 1951. On some larger Spine-tailed Swifts, with the description of a new subspecies from Nepal. *Ardea*, 39 (4): 318-321, pl. 9.—*Chaetura cochinchinensis rupchandii*, Hitauro.
- BISWAS, BISWAMOY. 1951. Notes on the taxonomic status of the Indian Plaintive Cuckoo *Cuculus passerinus* Vahl. *Ibis*, 93 (4): 596-598.—Concludes that *Cuculus passerinus* is a species distinct from *Cuculus merulinus*, although the two have hitherto been considered conspecific; *Cuculus querulus* is considered to be a race of *merulinus*. No mention is made of the allocation of other forms hitherto ranked. as races of *merulinus*. These cuckoos are by some authors placed in the genus *Cacomantis*.—J. L. Peters.
- BLACKWELL, J. A., AND W. H. DOWDESWELL. 1951. Local movement in the Blue Tit. *Brit. Birds*, 44 (12): 397-403.—Color banding of *Parus caeruleus* from 1947-1950; an expanse of school playing fields less than 200 yards wide served as a complete barrier between two populations.
- BOGHNAL, T. B. 1951. A note on the papers of Elton and Williams on the generic relations of species in small ecological communities. *Journ. Animal Ecol.*, 20: 242-245.—Related species are more likely to be found in similar, though not identical, habitats than are unrelated ones.
- BOURKE, P. A. 1951. Nesting notes on the Red-backed Parrot. *Emu*, 51 (1): 31-32.—A pair of *Psephotus haematonotus* nested in bird box; four eggs were laid between Sept. 29 and Oct. 7; incubation period was approximately 18-19 days, and the nestling period about 30 days.
- BOYD, ELIZABETH M. 1951. The external parasites of birds: a review. *Wilson Bull.*, 63 (4): 363-369.
- BRACKBILL, HERVEY. 1951. Wing-flashing by male Mockingbirds. *Wilson Bull.*, 63 (3): 204-206.—Observations of male and female *Mimus polyglottos* doing "wing-flashing."
- BRACKBILL, HERVEY. 1952. Three-brooded American Robins [*Turdus migratorius*]. *Bird-Banding*, 23 (1): 29.
- BRENNAN, J. M. 1951. Two new species of *Neoschongastia* with a key to the species of the world (Acarina: Trombiculidae). *Journ. Parasit.*, 37 (6): 577-582.—New species from *Momotus lessonii* in Guatemala and *Petrochelidon p. pyrrhonota* in Montana. Larvae of all species of the genus are usually found on birds.
- BRUNS, HERBERT. 1951. Verbreitung, Biotop, Bestandsschwankungen und Brutbiologisches vom Ortolan (*Emberiza hortulana* L.) in nordwestdeutschen Tiefland. *Ornith. Abhd.*, 12: 1-22.
- BRYANT, C. E. 1951. A query on Landrail behaviour. *Emu*, 51 (1): 73-75, 1 pl.—The author considers it quite likely that a female *Rallus philippensis*, after the discovery of her nest and eight fresh eggs near Melbourne, Victoria, constructed a new nest ten feet away and moved the entire clutch to the new location.
- BRYANT, C. E. 1951. What are "natural conditions" for Gouldian Finches? *Emu*, 51 (1): 77-78.
- BYERS, ESTHER. 1951. Feeding behavior of young American Bitterns. *Wilson Bull.*, 63 (4): 334-336, 1 table.

- CABLE, R. M., AND M. L. KUNS. 1951. The trematode family Microphallidae with the description of *Carneophallus trilobatus* gen. et sp. nov. from Mexico. Journ. Parasit., 37 (5, Sect. 1): 507-514.—The new form is from *Buteo magnirostris griseocauda*.
- CADE, TOM. 1952. Notes on the birds of Sledge Island, Bering Sea, Alaska. Condor, 54 (1): 51-54.—Field work carried on from June 7 to 15, 1950, resulted in 35 species being found. Notes on ecology and life histories presented in annotated list.
- CALABY, J. H. 1951. Notes on the Little Eagle: with particular reference to rabbit predation. Emu, 51 (1): 33-56, 1 fig.—During the course of rabbit, *Oryctolagus cuniculus*, control experiments conducted in the Murray Valley region of northern Victoria, observations were made on the effect of Little Eagle, *Hieraaetus morphnoides*, predation on the rabbit population. The appearance of the Little Eagle in the field and flight characters distinguishing it from the Whistling Eagle, *Haliastur sphenurus*, are described. There are sections dealing with notes, display and posturing, hunting habits, and relations with other birds frequenting the study area. From six to nine Little Eagles frequented the 450-acre study tract which contained an estimated population of 4500 adult rabbits and 6400 "kittens." During the 71-day observation period during May, June, and July, 1950, an average of six Little Eagles is believed to have killed 260 of the kittens, mostly three to six weeks old, resulting in an overall decrease of 2.5 per cent in the total rabbit population.—J. L. Peters.
- CAMMAM, S. V. R. 1950. The story of Hornbill ivory. Bull. Univ. Mus. (Univ. Penna.), 15 (4): 19-46, 17 figs.—Decorative carvings by Chinese and East Indian artists on the hard casque of the Helmeted Hornbill, *Rhinoplax vigil*.
- CARR, MARJORIE H., AND J. C. DICKINSON, JR. 1951. The San Geronimo Swift in Honduras. Wilson Bull., 63 (4): 271-273.—Notes on and a nesting record for *Panyptila sancti-hieronymi*.
- CHISHOLM, A. H. 1951. More about vocal mimicry. Emu, 51 (1): 75-76.
- CLANCEY, P. A., AND C. S. HOLLIDAY. 1951. A systematic revision of the races of *Lamprocolius nitens* (Linnaeus) endemic to the South African subcontinent. Ostrich, 22: 111-116.—*Lamprocolius nitens culminator* new subspecies from the Addo Bush near Port Elizabeth, Cape Province.
- CLAUDON, ANDRÉ, C. J. 1951. Notes sur le Coucou gris, *Cuculus c. canorus* en Alsace. L'Oiseau, 21 (3): 200-215.—The study of about 100 parasitized nests of small passerines, the most common species to be victimized by far being *Acrocephalus scirpaceus* (80 times out of a 100).
- CLAY, THERESA. 1951. The mallophaga and relationships within the Falconiformes. Ibis, 93 (4): 628.
- DE CHAVIGNY, J. 1951. Pontes nombreuses provoquées. Alauda, 19 (2): 113.—One egg was taken each day for 16 consecutive days from a nest of *Sturnus vulgaris* containing three eggs, the female replacing it every day. The author states that he "got tired of this experiment" on the 16th day!—C. Vaurie.
- DEIGMAN, H. G. 1951. A new Frogmouth from Groote Eylandt, Gulf of Carpentaria. Emu, 51 (1): 71-73.—*Podargus strigoides lilae* (Ambukwamba, Groote Eylandt, Gulf of Carpentaria), new subspecies.
- DE RUITER, L. COOMANS. 1951. Vogels van het dal van de Bodjo-rivier (Zuid-Celebes). Ardea, 39 (4): 261-318, pls. 4-8.—In Dutch, apparently containing many field observations; 92 species reported.
- DICKINSON, J. C., JR. 1951. A nest of *Chaetura vauxi richmondii* in central Honduras. Wilson Bull., 63 (3): 201-202, 1 photo.

- DIERSCHKE, FRITZ. 1951. Die Vogelbestände einiger Erlenbruchwälder Ostpreussens und Niedersachsens. Ornith. Abhd., 10: 1-32, 3 figs., 3 tables.
- D'OMBRAIN, A. F. 1951. Water birds and others in flooded areas along the Hunter River Valley, N. S. W. Emu, 51 (2): 145-147.—The valley has become practically one vast swamp due to a succession of floods during 18 months previous to the preparation of this paper. There is a briefly annotated list of the birds, chiefly waders, gallinules, ibises, herons, and waterfowl that may be observed from the train from Maitland to Newcastle.
- DOUAUD, J. 1951. Les oies sauvages dans l'estuaire de la Loire, hiver 1950-1951. Alauda, 19 (3): 172-177.
- DOUGHERTY, E. C. 1951. Evolution of zooparasitic groups in the phylum Nematoda, with special reference to host-distribution. Journ. Parasit., 37 (4): 353-378.—Traces probable evolution of several groups of parasitic nematodes. The sub-order Strongylina (= Strongylata), including several groups of bird parasites, is treated in detail, and correlated with vertebrate evolutionary history.
- DROST, RUDOLPH. 1951. Kennzeichen für Alter und Geschlecht bei Sperlingsvögeln. Ornith. Merkblätter (Vogelwarte Helgoland, Wilhelmshaven), No. 1: 1-26.—Age, seasonal, and sex criteria are given for a number of fringillids, parids, and turdids.
- EISENMANN, EUGENE. 1951. Northern birds summering in Panama. Wilson Bull., 63 (3): 181-185.—Notes on 18 northern species observed summering in Panama and evidence that at least many of these individuals are immature.
- EISENMANN, EUGENE. 1952. Annotated list of birds of Barro Colorado Island, Panama Canal Zone. Smithsonian Misc. Coll., 117 (5): 1-62.
- EVENDEN, FRED G., JR. 1949. Nesting of the Long-billed Marsh Wren in western Oregon. Murrelet, 30 (3): 58.—Nests with eggs found in Willamette Valley, April 24 to May 22; only one previous published nest record from western Oregon.
- FERRY, C. AND F. 1951. Le Courlis cendré [*Numenius arquata*] nicheur en Côte-d'Or. Alauda, 19 (2): 113-116.—Nesting of this species in eastern France.
- FISCHER, RICHARD B. 1951. Data on the food habits of local owls. Proc. Linn. Soc. New York, Nos. 58-62: 46-48, 1 table.—In vicinity of New York; seven species of owls.
- FLEAY, DAVID. 1951. The Little Eagle in the Healesville District, Victoria. Emu, 51 (1): 57-65, 4 pls.—This paper is intended as an adjunct to the more comprehensive account of this species by J. H. Calaby, published in the same number of the 'Emu.'
- GEHR, AGNES R. 1952. Jared Potter Kirtland. The Explorer [Cleveland Mus. Nat. Hist.], 2 (7): 1-33.—An interesting biography of Dr. Kirtland, whose range of interests almost rivaled that of Dr. Franklin.
- GEROUDET, PAUL. 1951. A propos de la Perdrix Rouge [*Alectoris rufa*] en Haute Savoie. Alauda, 19 (2): 84-87.—This species does not occur now in Switzerland. Commentaries on old records.
- GIBSON, J. A. 1951. The breeding distribution, population and history of the birds of Ailsa Craig [cont.]. Scot. Nat., 63 (3): 159-177.
- GODDARD, M. T., AND K. A. HINDWOOD. 1951. Sea-birds and cyclones: some interesting New South Wales records. Emu, 51 (2): 169-171.—During an easterly gale which lasted from June 22 to 26, 1950, two *Sterna fuscata*, one *Pterodroma lessonii*, and one *Pterodroma macroptera* were picked up in the Dorriggo Tablelands district, 25 miles from the coast of New South Wales, and at an elevation of more than 2000 feet above sea level.

- GOODGE, WILLIAM. 1950. Some notes on the birds of the San Juan Islands [Wash.]. Murrelet, 31 (2): 27-28.—Annotated list of 29 species which are either new to the area, collected as specimens for the first time, or which have shown a change in status between 1935 and 1948 or 1949.
- GRANT, C. H. B., AND C. W. MACKWORTH-PRAED. 1951. On the type locality of *Struthio camelus* Linnaeus, and description of a new race. Bull. Brit. Orn. Club, 71 (7): 45-46.—The type locality of *S. camelus* Linn. is considered to be Syria. Consequently *S. c. syriacus* Roths. is placed in the synonymy of the typical race, and the bird of northern Africa is named *Struthio camelus rothschildi* new subspecies.
- GRANT, C. H. B., AND C. W. MACKWORTH-PRAED. 1951. On the status of *Eremopterix signata cavei* Grant and Praed. Bull. Brit. Orn. Club, 71 (7): 46.—Is synonymous with *E. signata harrisoni* O. Grant.
- GRANT, C. H. B., AND C. W. MACKWORTH-PRAED. 1951. On the type of *Tchitrea perspicillata suahelica* (Reichenow) and the status of *Tchitrea perspicillata ungujaensis* Grant and Praed. Bull. Brit. Orn. Club, 71 (7): 47.—*T. p. ungujaensis* is a synonym of *suahelica*.
- GRANT, C. H. B., AND C. W. MACKWORTH-PRAED. 1951. Two new races of Great Grey Shrike. Bull. Brit. Orn. Club, 71 (8): 54-55.—*Lanius excubitor batesi* (between Sfax and Agareb, eastern Tunisia), *Lanius excubitor dubarensis* (Dubar, about seven miles south of Berbera, British Somaliland), new subspecies.
- GRAUSTEIN, JEANNETTE E. 1952. Audubon and Nuttall. Sci. Monthly, 74: 84-90.
- GUIGUET, C. J. 1950. Notes on Common Murres nesting in British Columbia. Murrelet, 31 (1): 12-13.—3000 adults estimated on Triangle Island; egg laying had just begun when the island was visited, June 25 to July 1, 1949.
- GULLION, GORDON W. 1951. The frontal shield of the American Coot. Wilson Bull., 63 (3): 157-166, 2 figs.—Structure, changes with the season and with hormone treatments, and function of the frontal shield of *Fulica americana*. It enlarges prior to the nesting season and its size is positively correlated with aggressive territorial behavior.—J. T. Tanner.
- HAGENSTEIN, WALTER. 1950. European Starling (*Sturnus vulgaris*) at Medina, King County, Washington. Murrelet, 31 (1): 11.
- HALE, JAMES B., AND ROBERT F. WENDT. 1951. Amphibians and snakes as Ruffed Grouse [*Bonasa umbellus*] food. Wilson Bull., 63 (3): 200-201, 1 photo.
- HANSON, H. C., AND R. E. GRIFFITH. 1952. Notes on the South Atlantic Canada Goose population. Bird-Banding, 23 (1): 1-22.—Report based on the banding and recovery records of the Jack Miner Sanctuary near Kingsville, Ontario; five maps and five tables summarize the results. Breeding and wintering grounds and migration routes are discussed. A chart shows the winter populations of *Branta canadensis* on four National Refuges; they increased from 50,000 in 1941-42 to 150,000 in 1950-51.
- HARRISON, HAL H. 1951. Notes and observations on the Wilson's Warbler. Wilson Bull., 63 (3): 143-148, 3 photos.—Summary of the literature and observations in Maine on the nesting of *Wilsonia pusilla*.
- HARRISON, J. M. 1951. A series of abnormal eggs. Bull. Brit. Orn. Club, 71 (7): 43-45.
- HARRISON, J. M. 1951. Exhibition of, and remarks upon dimorphism in the female of the Rock-Bunting, *Emberiza cia* Linnaeus, and a male-feathered female Common Redstart, *Phoenicurus phoenicurus phoenicurus* (Linnaeus). Bull. Brit. Orn. Club, 71 (8): 56-57.—The Rock-Bunting exhibits well marked sexual dimorphism;

- further the females are dimorphic in having a male-like phase and a brown phase. The author believes that the two types are genetically determined. A Redstart in male plumage, upon dissection, proved to be a female with an egg in the oviduct. In this case the author believes that the specimen must be regarded as a genetically-determined cock-feathered hen.
- HAWKINS, LAURENCE F. 1951. Seven years of bird-watching in Chelsea (Manhattan). Proc. Linn. Soc. New York, Nos. 58-62: 55-62.—Records of birds occurring in the backyards of 10 city houses, which are enclosed by four- and five-story houses.
- HECHT, WILLIAM ROBERT. 1951. Nesting of the Marsh Hawk at Delta, Manitoba. Wilson Bull., 63 (3): 167-176, 1 fig., 1 table.—Nesting, food habits, and relationships with waterfowl of *Circus cyaneus*.
- HEIM DE BALSAC, H. AND T. 1951. Les migrations des oiseaux dans l'ouest du continent africain. Alauda, 19 (2): 97-112, and 19 (3): 157-171.
- HEIM DE BALSAC, H., AND N. MAYAUD. 1951. Sur la morphologie, la biologie et la systématique de *Cercotrichas podobe*. Alauda, 19 (3): 137-151, 1 fig.—The authors describe in detail the plumages of the adult and the young and the habits, breeding, and eggs of this species and conclude that the genus *Cercotrichas* cannot be maintained and should be merged with, or at least reduced to a subgenus of *Erythropgia*.—C. Vaurie.
- HERMAN, C. M. 1951. Blood parasites from California ducks and geese. Journ. Parasit., 37 (3): 280-282.—A survey of 1,011 anatids for blood parasites is summarized.
- HERTZOG, LOUIS. 1951. L'espèce *Sylvia atricapilla* s'apprête-t-elle à troquer le beau "forte" de son chant contre une banale rengaine à redites? Alauda, 19 (3): 185-186.—Possible changes in the song of this species in Wurttemberg.
- HINDE, R. E., AND J. FISHER. 1951. Further observations on the opening of milk bottles by birds. Brit. Birds, 44 (12): 393-396.—Records from Denmark, Sweden, Holland; Great and Blue tits, *Parus major* and *caeruleus*, and Great Spotted Woodpeckers, *Dendrocopos major*, are involved. There is discussion of the probable learning factors in this behavior.
- HINDWOOD, K. A. Moth larvae in birds' nests. Emu, 51 (2): 121-133, 2 figs.—Larvae of the genus *Neossiosynoeca* are recorded in nesting holes of parrots, where they feed on the excreta of the young; a species of the genus *Coesyra* is known from the nests of four species of Ploceidae where its larvae feed on faeces and feathers. One species of *Monopis* occurs in the larval stage in hawk and owl pellets.
- HOFFMANN, L., AND H. WACKERNAGEL. 1951. Le Martinet pâle (*Apus pallidus*) niche à Banyuls. L'Oiseau, 21 (3): 216-217.—An account of the first authentic nesting record in France. This record has already been published by Dr. and Mrs. D. Lack (Alauda, 19 (1): 49, 1951) but, according to the editor of 'L'Oiseau,' credit for this discovery is due to Hoffmann who "indicated the colony to Mr. and Mrs. Lack," the note of Hoffmann being in press when the note in 'Alauda' appeared.
- HORSTMANN, E. 1950. Schwarm und Phalanx als überindividuelle Lebensformen. Forschungsstätte Spiederog., No. 1: 1-24, 13 figs.—Observations on Starlings, with comments on other species.
- HOSKING, ERIC, AND STUART SMITH. 1952. High speed photography as an aid to the identification of prey.—II. Brit. Birds, 45 (3): 101-103.—Photographs of *Phoenicurus ochrurus* and *Acrocephalus palustris* with moths in their bills. These are identified as to species, as are many other insects.

- HÔZ, FRANÇOIS. 1951. Le Martinet pâle [*Apus pallidus*] nidificateur en France continentale. *L'Oiseau*, 21 (3): 217-221.—The author, who gives due credit to Hoffmann (see mention of the note by Hoffmann and Wackernagel in this issue of 'The Auk') for his discovery, gives an interesting account of the nesting of this species illustrated by two figures on the position of the nest.
- JEFFERY, R. G., AND R. LIVERSIDGE. 1951. Notes on the Chestnut-banded Sandplover, *Charadrius pallidus pallidus*. *Ostrich*, 22: 68-76.—Life history, photographs.
- JOUANIN, CHRISTIAN. 1951. Étude d'une collection d'oiseaux des Iles Kerguelen. *Bull. Mus. Nat'l. Hist. Nat. [Paris]*, 2nd ser., 23 (4): 347-356.
- KAGAN, I. G. 1951. Aspects in the life history of *Neoleucochloridium problematicum* (Magath, 1920) new comb. and *Leucochloridium cyanocittae* McIntosh, 1932 (Trematoda: Brachylaemidae). *Trans. Amer. Micro. Soc.*, 70 (4): 281-318.—The life cycle of *N. problematicum* in nature takes one year. Gallinules and other rallids become infested in the spring by eating snails whose tentacles contain the pulsating, red-brown broodsacs (containing metacercariae). Young snails become infested by eating the eggs in bird feces in the summer. The life cycle of *L. cyanocittae* is similar; the broodsac is green; the natural final host is the Red-winged Blackbird.
- KIERAN, JOHN. 1951. Dr. Clyde Fisher. *Proc. Linn. Soc. New York*, Nos. 58-62: 76-78.—A memorial.
- KINGSCOTE, A. A. 1951. A note on *Ribeiroia ondatrae* Price, 1931 (Trematoda). *Journ. Parasit.*, 37 (3): 324.—Parasitic in domestic goose.
- KURTH, DUDLEY. 1951. The Mewstone rookery of the White-capped Albatross. *Emu*, 51 (1): 76-77.—*Diomedea cauta* is believed to nest on the Mewstone, a small islet about half a mile in circumference, situated in lat. 43° 44' S. and long 146° 23' E.
- LABITTE, ANDRÉ. 1951. Notes sur le Busard cendré, *Circus pygargus*. *L'Oiseau*, 21 (3): 188-193.—Nesting.
- LACK, DAVID. 1951. Geographical variation in *Erithacus rubecula*. *Ibis*, 93 (4): 629-630.—Believes that in the case of this species at least the use of trinomials gives a misleading picture of the natural variation, and that it would be "simpler and more precise to describe the trends of variation in terms of geographical areas, omitting subspecific names altogether."
- LACK, DAVID, AND ELIZABETH LACK. 1951. Further changes in bird-life caused by afforestation. *Journ. Animal Ecol.*, 20: 173-179.—In areas planted to pine, three groups of birds are found at different times: until the pines are 8 yrs. old; 8 through 15 years; and in tall older trees. Bird populations are lowest in the first and highest in the second stages.
- LACK, DAVID, AND ELIZABETH LACK. 1951. The breeding biology of the Swift *Apus apus*. *Ibis*, 93 (4): 501-546.—A painstaking study based on five seasons of study in the vicinity of Oxford, England. Data are presented on weights of adults and nestlings, clutch-size, weight of eggs, incubation, duration of the incubation and nesting periods, growth, and feeding frequency. Of special interest are the correlations between weather and nestling survival; during the month of June in 1946, 1947, and 1948, the total hours of sunshine during the second half of the month were below average and the survival rate of the June-hatched birds was only 39 per cent, while in June, 1949, with large amounts of sunshine, the rate jumped to 91 per cent. Also, nestling mortality is higher in large broods (*i. e.* 3 young) than in smaller broods (*i. e.* 1 or 2 young) during bad weather. The

- young are fed meals of the same size regardless of weather, but during fine periods the feedings are more frequent.—J. L. Peters.
- LACK, DAVID, AND ELIZABETH LACK. 1952. Visible migration at Land's End. Brit. Birds, 45 (3): 81-96.—Observations in October, 1951, of Skylarks (*Alauda arvensis*), Chaffinches (*Fringilla coelebs*), and Starlings (*Sturnus vulgaris*) migrating towards Spain and Ireland; five maps show the movements of the birds.
- LAMPIO, TEFFO. 1951. On the significance of predators in the control and dispersal of the diseases of game. Papers on Game Res. (Finn. Found. Game Preserv.), No. 6: 1-20, many graphs and tables.
- LAURENT, GASTON. 1951. La Tourterelle turque en France. *Alauda*, 19 (2): 116.—First record of *Streptopelia decaocto* for France.
- LEA, ROBERT B., AND E. P. EDWARDS. 1951. A nest of the Rufous-breasted Spinetail [*Synallaxis erythrothorax*] in Mexico. Wilson Bull., 63 (4): 337-338, 1 photo.
- LEARMONTH, NOEL F. 1951. Further notes on *Neositta pileata* and *N. chrysoptera*. Emu, 51 (1): 15-16.—Cites instances of two forms overlapping in the Portland district of Victoria, Australia.
- LEARMONTH, NOEL F. 1951. More observations on swifts. Emu, 51 (2): 151-152.—Observations on wintering flocks of *Hirundapus caudacutus* and *Apus pacificus* in the Portland, Victoria, region; appearances are usually noted during times of falling barometric pressure.
- LEHMANN, ERNST VON. 1951. Zur Brutbiologie des Baumpiepers (*Anthus tr. trivialis* L.). Bonner Zool. Beitr., 2 (3-4): 225-227.
- LEPORATI, LAMBERTO. 1951. Condizioni faunistico-venatorie dell'Estuario Veneto. Ricerche di Zool. Applicata alla Caccia. XXI. (Lab. Zool. Appl., Univ. Bologna), pp. 1-63, tables and figs.—This is an interesting study and analysis of waterfowl numbers over a period of 20 years in the Laguna di Venezia on the Adriatic Sea. Various factors in this locality have been investigated as part of an attempt to correlate local conditions with numbers of waterfowl. The "hydrobiological environment" locally has changed little, and it is concluded that the decrease in waterfowl is primarily the result of the multifarious activities of man in distant areas. Comparisons are made between the periods 1930-1950 and 1903-1911. Some cyclical variation has been noted in the Mallard, Teal, and Garganey.
- Of special interest is the fact that summaries are given in Italian, French, English, and German.—H. I. Fisher.
- LEVY, SEYMOUR H. 1950. Summer birds in southern Idaho. Murrelet, 31 (1): 2-8.—Notes on distribution and status of 134 species observed or collected in June, July, and August, 1949.
- LIGON, J. STOKLEY. 1952. The vanishing Masked Bobwhite. Condor, 54 (1): 48-50.—*Colinus virginianus ridgwayi* is virtually extinct in the wild. Several trips have been made into Mexico to obtain birds for restocking in Arizona and New Mexico.
- LOWERY, G. H., JR., AND R. J. NEWMAN. 1951. Notes on the ornithology of southeastern San Luis Potosi. Wilson Bull., 63 (4): 315-322.—A brief history of the ornithology of this Mexican region and an annotated list of 32 species.
- LUDLOW, FRANK. 1951. The birds of Kongbo and Pome, south-east Tibet. Ibis, 93 (4): 547-578, 2 pls. (1 map).—A vivid but brief account of the itinerary of the author's party in penetrating a practically unexplored portion of Tibet, with interesting comments on the physiography and climate of the region. The trip,

- which occupied 14 months between October, 1946, and December, 1947, was primarily for botanical collecting. Nevertheless the annotated list of 191 forms of birds observed, most of them represented by one or more specimens, proves that the ornithological aspects were by no means neglected.—J. L. Peters.
- MADSEN, H. 1951. Notes on the species of *Capillaria* Zeder, 1800, known from gallinaceous birds. *Journ. Parasit.*, 37 (3): 257-265.—Taxonomic notes, with a host and locality list for each species.
- MANUEL, CANUTO G., AND E. THOMAS GILLIARD. 1952. Undescribed and newly recorded Philippine birds. *Amer. Mus. Novit.*, No. 1545: 1-9.—*Dicaeum rubricapilla*—new species from Mt. Kampalili, Davao, Mindanao. *Accipiter trivirgatus castroi* from Anibawan, Polillo, and *Otus bakkamoena batanensis* from Basco, Batan, new subspecies. New records for other species.
- MANWELL, R. D. 1951. Leucocytozoa and other blood parasites of the Purple Grackle, *Quiscalus quiscula quiscula* [sic]. *Journ. Parasit.*, 37 (3): 301-306.—A survey of 75 grackles is summarized.
- MANWELL, R. D. 1951. Ecoerythrocytic stages in *Plasmodium hexamerium*. *Journ. Parasit.*, 37 (3): 319-320.—In *Vermivora celata*.
- MANWELL, R. D. 1951. Acute malaria in a Canada Jay of the high Rockies. *Journ. Parasit.*, 37 (3): 322.
- MARSHALL, A. J. 1951. The refractory period of testis rhythm in birds and its possible bearing on breeding and migration. *Wilson Bull.*, 63 (4): 238-262, 8 figs.—Following the breeding season the testes of birds undergo a metamorphosis of the tubules and interstitial cells, and during this refractory period sexual activity is greatly reduced and cannot be produced by stimuli such as increased light. After testis regeneration, sexual activity returns in such forms as autumnal singing, and some species can now be stimulated to develop into the breeding condition. The testicular rhythm is thought to be the most important single factor in the approximate timing of the breeding cycle, and when the bird is capable of reproduction, certain environmental factors finally stimulate breeding activity. As a result, breeding activity is synchronized with suitable seasons. Several environmental factors affecting the breeding time of different species are discussed. An appendix describes a histological technique for determining the condition of the testes.—J. T. Tanner.
- MATVEYEFF (MATVEJEV), S. D. 1951. [Avifauna of the Tara Mountains, western Serbia, 1950]. *Trav. de L'Inst. d'Ecol. et Biogeographie*, 11 (2): 71-113, 11 figs., 2 tables.—Analysis of composition and densities, as well as species accounts.
- MAYAUD, NOËL. 1951. Le plumage pré-nuptial d'*Oenanthe oe. seebohmi*. *Alauda*, 19 (2): 88-96, 4 figs.—Detailed study of plumages of the juvenile and adult. The "dimorphism" of the author seems to be a function of the degree of the sexual maturity of the individual. The figures are good.—C. Vaurie.
- MAYAUD, NOËL. 1951. Observations sur la migration en pays basque. *Alauda*, 19 (2): 116-119.
- MAYR, ERNST. 1951. Notes on some pigeons and parrots from Western Australia. *Emu*, 51 (2): 137-145.—This paper is the first of a series based on a recent collection of 1037 specimens from some of the type localities in mid-western Australia whence G. M. Mathews described many of his proposed new subspecies, often on inadequate material. The author concludes that *Geopelia striata clelandi* Math., and *G. humeralis headlandi* Math. are valid forms; *Lophophaps plumifera* Gould and *L. ferruginea* Gould are shown to be conspecific with four recognizable races—*L. p. plumifera*, *L. p. ferruginea*, *L. p. mungi* Math., and *L. p. proxima* new subsp.

- (Hall's Creek Road). *Ocyphaps lophotes whitlocki* is considered valid, as is *Kakatoe roseicapilla kuhli*.—J. L. Peters.
- MAYER, ERNST [= MAYR, ERNST], AND R. MEINERTZHAGEN. 1951. What is *Sylvia ticehursti* Meinertzhagen. Bull. Brit. Orn. Club, 71 (7): 47-48.—This species, known only from the unique type, is believed to be the southwestern Morocco race of either *S. conspicillata* or *S. deserticola* but determination of the actual status requires additional collecting and field studies.
- MCGILL, ARNOLD R. 1951. Further notes on the Sittellas. Emu, 51 (1): 11-14, 1 pl. (photo).—Believes that "the true status of these interesting birds [i. e. the Australian forms of *Neositta*] will only be made clear by future collecting in the comparatively small zones of apparent overlap, or by careful and comprehensive field work."
- McMANNAMA, ZELLA. 1950. Additional notes on the birds of the San Juan Islands [Wash.]. Murrelet, 31 (2): 29-30.—Annotated list of 18 species, 10 of which are new to the area.
- MEINERTZHAGEN, R. 1951. On *Struthio camelus syriacus* Rothschild. Bull. Brit. Orn. Club, 71 (7): 46.—Objects (and quite rightly) to the action of Grant and Mackworth-Praed (t. c. p. 45-46) in rejecting *S. c. syriacus*.—J. L. Peters.
- MEINERTZHAGEN, R. 1951. Migration in West Ireland. Bull. Brit. Orn. Club, 71 (8): 58.—Observation on the speed of flight of four species of birds, using a stop-watch and a measured base.
- MEISE, WILHELM. 1951. Notes on the ornithological collections of Preiss in the Swan River Colony, 1838-1841. Emu, 51 (2): 148-151.—A German physician, Ludwig Preiss, collected birds in the Swan River Colony in Western Australia beginning in 1839 and continuing for about two years. His collection amounting to at least 162 species and 600 specimens was disposed of to German museums. A survey conducted by Dr. Meise shows 22 mounted specimens, representing 21 species, were in Hamburg before the war, and there are also nine species in the Berlin Museum, but the bulk of the collection went to the Museum Heineanum in Halberstadt. Dr. Meise believes that 100 species and 165 specimens were sold to Heine by Preiss in 1848. The disposition of 70 species and at least 400 skins is unaccounted for and, if not lost, the specimens must be stored in other European collections. There are other notes on individual specimens from this source in the Heine collection.—J. L. Peters.
- MIDDLETON, RAYMOND J. 1952. Thirty years of banding at Norristown, Pennsylvania. Bird-Banding, 23 (1): 22-28.—35,005 birds have been banded; 1229 have returned, and 267 were recovered at a distance. Birds at least seven years old were Tufted Titmouse, Red-eyed Vireo, Wood Thrush, and six Tree Sparrows; eight years old, Crested Flycatcher, Junco, two Tree Sparrows, three Purple Grackles; nine years, Robin.
- MILES, J. A. R., AND J. B. SHRIVASTAV. 1951. Ornithosis in certain sea-birds. Journ. Animal Ecol., 20: 195-200.—Infections of "psittacosis" virus are old-established in the Laridae but probably arose for the first time in the Fulmar, *Fulmarus glacialis*, around 1930.
- MILLER, R. R., AND H. E. WINN. 1951. Observations on fish-eating by the Great-tailed Grackle [*Cassidix mexicanus*] in southeastern Arizona. Wilson Bull., 63 (3): 207-208.
- MILON, PH. 1951. Notes d'observation a Madagascar, 4. Alauda, 19 (3): 152-156.—Description and possible significance of the vibratory movements of the legs in *Charadrius tricoloris bifrontatus*.

- MITCHELL, GEORGE J. 1949. Trumpeter Swans at Tahsis, Vancouver Island. *Murrelet*, 30 (3): 59.—Up to 23 wintered in 1948-49. They were noted there the two previous winters.
- MOORE, A. D. 1951. Adaptations of animals to climatic extremes: a review. *Wilson Bull.*, 63 (4): 358-362.—Critical comments on three papers about cold adaptation of mammals and birds.
- MOUILLARD, BERNARD. 1951. Comportement hivernal de la Lavandière jaune *Motacilla cinerea*. *Alauda*, 19 (2): 121.—A winter roost in a large city.
- NEILAND, K. A. 1951. A new genus of trematode (Lecithodendriidae: Pleurogenetinae) from the Varied Thrush. *Journ. Parasit.*, 37 (6): 563-568.—From Washington state.
- PARKES, KENNETH C. 1952. The races of the Bald Starling of the Philippines. *Condor*, 54 (1): 55-57.—The recommendation is made that four races of the species *Sarcops calvus* be recognized, namely *S. c. calvus*, *mindorensis*, *lowii*, and *melanotus*.
- PARQUIN, ABBÉ P. 1951. Observations faites dans l'océan indien (1-7 octobre 1948). *Alauda*, 19 (3): 183-185.—Petrels observed between Socotra and Ceylon.
- PEARSE, THEOD. 1950. Parasitic birds. *Murrelet*, 31 (1): 14.—Horned Grebes took food from a Surf Scoter, and Glaucous-winged Gulls took food from Pacific Loons.
- PREITZMEIER, JOSEF. 1951. Zum ökologischen Verhalten der Misteldrossel (*Turdus v. viscivorus* L.) in Nordwesteuropa. *Bonner Zool. Beitr.*, 2 (3-4): 217-224.
- PETERLE, TONY J. 1951. Intergeneric galliform hybrids: a review. *Wilson Bull.*, 63 (3): 219-224, 1 fig.—A summary of the records in the literature, plus an additional one, and notes on habitat and breeding behavior in relation to hybridization.
- PHILLIPS, ALLAN R. 1951. The molts of the Rufous-winged Sparrow. *Wilson Bull.*, 63 (4): 323-326.—Postnuptial and prenuptial molts, both complete or nearly so, of *Aimophila carpalis*.
- PHILLIPS, RICHARD S. 1951. Nest location, Cowbird parasitism, and nesting success of the Indigo Bunting. *Wilson Bull.*, 63 (3): 206-207, 1 table.—Fourteen nests of *Passerina cyanea* during three summers.
- PRESTON, F. W. 1951. Flight speed of Common Loon (*Gavia immer*). *Wilson Bull.*, 63 (3): 198, 1 fig.
- RACEY, KENNETH. 1950. Status of the European Starling in British Columbia. *Murrelet*, 31 (2): 30-31.—First collected in January, 1947; new locality records almost all made in late fall and winter; one breeding record.
- RAND, A. L. 1951. Birds from Liberia. *Fieldiana: Zool.*, 32 (9): 561-653, 1 map.—This is a report on nearly 700 specimens from two localities in Liberia. At present 310 species and subspecies are known from there. The discussion of barriers between Upper and Lower Guinea subspecies brings out that the Mount Cameroon—Cameroon Highlands constituted an important barrier in the past, and it still may have some effect. A later and still-existing barrier is a gap in the forest in the Lagos-Accra area. Races formed by the first barrier may be about 22,000 years old, and those by the later, less than 12,000 years of age.—H. I. Fisher.
- RAND, R. W. 1951. Birds breeding on Seal Island (False Bay, Cape Province) [Africa]. *Ostrich*, 22: 94-103.—Life history notes on guano birds; photographs.
- RANGER, GORDON. 1951. Life of the Crowned Hornbill (Part IV), *Lophoceros suahelicus australis*. *Ostrich*, 22: 77-93.—Photos.
- RIPLEY, S. DILLON. 1951. Remarks on the Philippine Mallard. *Wilson Bull.*, 63 (3): 189-191, 1 fig.—Largely on a pair of captive *Anas lusonica*, their eggs, and downy young.

- ROBINS, D. R., AND W. B. HEED. 1951. Bird notes from La Joya de Salas, Tamaulipas. *Wilson Bull.*, **63** (4): 263-270, 2 photos.—On 18 species of Mexican birds.
- ROUGEOT, PIERRE CLAUDE. 1951. Notes biologiques sur les oiseaux du Woleu-N'tem (Gabon). *L'Oiseau*, **21** (3): 162-187.—Numerous observations on the avifauna of this region in the equatorial rain forest.
- ROWLEY, IAN. 1951. Courtship feeding of Dusky Wood-swallows. *Emu*, **51** (1): 80.
- RUSLING, WILLIAM J. 1951. Food habits of New Jersey owls. *Proc. Linn. Soc. New York*, Nos. 58-62: 38-45, 2 tables.
- RUTHEKE, PAUL. 1951. Die Brutvögel des Mönnegebietes im pommerschen Oderdelta. *Ornith. Abhd.*, **11**: 1-40.
- SAPIN-JALOUSTRE, J., AND F. BOURLIERE. 1951. Incubation et développement du poussin chez le Manchot Adélie, *Pygoscelis adeliae*. *Alauda*, **19** (2): 65-87, pls. 1-2.—A detailed account of the life history of this well investigated species of penguin on Adélie Land, covering the period from laying of first egg to final stay of the young in communal crèches. In 1950 the first egg was apparently laid on November 10 and the last on December 10. The usual clutch is two eggs and the maximum three. The period of incubation varies between 33 and 37 days. The period of growth of the young is about seven weeks. Many valuable observations on the behavior of the parents, their fasting, growth and thermoregulation of the young and their behavior in the crèches. In the rookeries studied the mortality of eggs and young due to the depredations caused by skuas and other factors amounted to 70 per cent. Four excellent photographs in two plates.—C. Vaurie.
- SAUNDERS, DOROTHY CHAPMAN. 1951. Territorial songs of the White-winged Dove. *Wilson Bull.*, **63** (4): 330-332, 1 fig.—Description of several songs of *Zenaida asiatica* with musical notation.
- SAVAGE, A., AND W. B. MCTAVISH. 1951. *Plasmodium circumflexum* in a Manitoba duck. *Journ. Parasit.*, **37** (6): 533-534.—From *Arctonetta fischeri* captured alive in Alaska but examined in Manitoba.
- SCHILLER, E. L. 1951. Studies on the helminth fauna of Alaska. VIII. Some cestode parasites of the Pacific Kittiwake (*Rissa tridactyla* Ridgway) with the description of *Haploparaxis rissae* n. sp. *Proc. Helm. Soc. Wash.*, **18** (2): 122-125.
- SCHWARTZ, C. W., AND ELIZABETH R. SCHWARTZ. 1951. Food habits of the Barred Dove in Hawaii. *Wilson Bull.*, **63** (3): 149-156, 1 fig., 1 photo, 1 table.—Kinds of food, almost wholly vegetable, and feeding behavior of the introduced *Geopelia striata*.
- SELDWITZ, WALTER. 1951. A numerical study of shorebirds on Long Island in 1947. *Proc. Linn. Soc. New York*, Nos. 58-62: 49-54, 6 tables.
- SERLE, WILLIAM. 1951. A new species of shrike and a new race of *Apalis* from West Africa. *Bull. Brit. Orn. Club*, **71** (7): 41-43.—*Chlorophoneus kupeensis* (Kupé Mountain, lat. 4° 45' N., long. 9° 40' E., Kumba Division, British Cameroons) new species; *Apalis rufogularis sanderi* (River Ogun, near Lagos, southwestern Nigeria) new subspecies.
- SERVENTY, D. L. 1951. The evolution of the Chestnut-shouldered Wrens (*Malurus*). *Emu*, **51** (2): 113-120, 2 text-figs. (maps).—An interesting discussion and elaborate speculation on the origin and relationships of four species of the genus *Malurus*—*lamerti*, *pulcherrimus*, *elegans*, and *amabilis*.
- SHAUB, B. M. 1951. Photographic records of captured birds. *Wilson Bull.*, **63** (4): 327-329, 1 fig.—Describing a method of photographing small, live birds.
- SHEWELL, E. L. 1951. Notes on the nesting of the White-fronted Sandplover, *Charadrius marginatus*. *Ostrich*, **22**: 117-119.—Believes eggs are half-buried in sand on hot sunny days to keep them from over-heating.

- SICK, HELMUT. 1951. An egg of the Umbrella Bird [*Cephalopterus ornatus*]. Wilson Bull., 63 (4): 338-339.
- SKELTON, KATHLEEN GREEN. 1951. Present size of the Everglade Kite [*Rosthamus sociabilis*] population at Lake Okeechobee, Florida. Wilson Bull., 63 (3): 198-199, 1 fig.
- SLIJPER, H. J. 1951. Een 17e Eeuwse Hollandse tekening van de Steltkluut, *Himantopus himantopus*. Ardea, 39 (4): 259-261, pl. 3.
- SMITH, K. D. 1951. A new race of lark from Eritrea. Bull. Brit. Orn. Club, 71 (8): 55-56.—*Calandrella cinerea asmaraensis* (near Asmara, Eritrea).
- STABLER, R. M. 1951. A survey of Colorado Band-tailed Pigeons, Mourning Doves, and Wild Common Pigeons for *Trichomonas gallinae*. Journ. Parasit., 37 (5, Sect. 1): 471-472.—High rates of infection were found in all species, evidences of pathogenicity in the latter two.
- STABLER, R. M. 1951. Effect of *Trichomonas gallinae* from diseased Mourning Doves on clean Domestic Pigeons. Journ. Parasit., 37 (5, Sect. 1): 473-478.—Strains of trichomonads from severe epidemic canker from the southeastern states were severely pathogenic in Domestic Pigeons. Infection with mild strains protected against virulent strains.
- STRESEMANN, ERWIN. 1951. Aus C. J. Temmincks Briefen an H. Lichtenstein. Ardea, 39 (4): 253-259.—Three letters in French from Temminck, mostly of personal interest, dated 1818, 1833, and 1856.
- STRESEMANN, ERWIN. 1951. Type localities of Australian birds collected by the 'Expedition Baudin' (1801-1803). Emu, 51 (1): 65-70.—Dr. Stresemann gives an interesting but brief account of the points in Australian and Tasmanian waters where the ships of the "Expédition Baudin"—'Le Géographe' and 'Le Naturaliste'—touched and where the scientific staff—Péron, Maugé, Lesueur, Leschenault, and Levillain collected, and shows that the labelling of the specimens was inaccurate in many cases. Poor labelling resulted in errors on the part of recent ornithologists who "restricted" type localities of some of the new species collected by the "Expédition Baudin" to localities in Australia where the Expedition never touched and whence the type could not possibly have been collected.—J. L. Peters.
- SUTTON, GEORGE MIKSCH. 1951. Dispersal of mistletoe by birds. Wilson Bull., 63 (4): 235-237, 1 pl.—Incomplete digestion of mistletoe fruits by birds results in the dispersal of the seeds. Observations are recorded of the feeding habits of Mexican euphonias (*Tanagra*) which feed to a large extent on mistletoe berries.
- SWANBERG, P. O. 1952. Studies of some species rarely photographed. XXXVII. The Shore-Lark. Brit. Birds, 45 (3): 97.—Excellent photographs of *Eremophila alpestris* at the nest in Swedish Lapland.
- THOMAS, HAL. 1951. Notes on the Pied Butcher-bird. Emu, 51 (2): 165-168.—A nest of *Cracticus nigrogularis* in the Mildura district of northwestern Victoria apparently contained young being brooded by an adult in the black and white plumage. Food was brought by a second adult and by an immature bird in the brown and white plumage. There were thus three birds in attendance at the nest.
- TINBERGEN, N., AND M. MOYNHAM. 1952. Head flagging in the Black-headed Gull; its function and origin. Brit. Birds, 45 (1): 19-22.—Five plates show threat and head flagging display in *Larus ridibundus*. Head flagging seems "to have the effect of nullifying the effect of threatening gestures and structures."
- TUZET, ODETTE, AND CLEMENT BESSIERE. 1951. La spermatogenèse d'*Anas platyrhynchos*. Alauda, 19 (3): 129-136, 3 figs.
- VAN CLEAVE, H. J., AND R. L. RAUSCH. 1951. The acanthocephalan parasites of Eider Ducks. Proc. Helm. Soc. Wash., 18 (1): 81-84.—Summary of occurrences.

- VAN TYNE, JOSSELYN, AND HAROLD MAYFIELD. 1952. Bird records from New Providence and Eleuthera islands, Bahamas. *Occ. Papers Mus. Zool. Univ. Mich.*, No. 538: 1-4.
- VLEUGHEL, D. A. 1951. Ultrahoge trek van Vinken, *Fringilla coelebs*, over de Noordzee in verband met de windrichting. *Ardea*, 39 (4): 341-353.—English summary. The view of L. Tinbergen that ultra-high seaward migration in autumn is closely connected with tail winds is stated to be false. In the opinion of the author "it is not the direction of the wind but the weather condition that comes first." An answer by L. Tinbergen is unfortunately not summarized in English.—C. Vaurie.
- VON BOETTICHER, H. 1951. La systématique des guêpiers. *L'Oiseau*, 21 (3): 194-199.—Granting that the number of genera of Bee-eaters may be too numerous, this treatment of a question meriting detailed analysis is much too perfunctory. The author recognizes but three genera: *Nyctornis*, *Meropiscus*, and *Merops*.
- VOOUS, K. H. 1951. Geographical variation of the Greenfinch, *Chloris chloris*. *Limosa*, 24 (3-4): 81-91.—Clinal and other geographic changes in color and size. Nine races recognized. Routes of dispersal from Mediterranean region.
- VOOUS, K. H. 1951. A new race of bullfinch from the Iberian Peninsula. *Limosa*, 24 (3-4): 131-133.—*Pyrrhula pyrrhula iberiae* (Linares de Riofrio, Salamanca, western Spain).
- VRYDAGH, J. M. 1951. Comportement des Hirondelles de Cheminee (*Hirundo rustica* L.) dans leur Quartier d'Hiver, au Nord du Congo Belge. *Gerfaut*, 41 (3): 177-195.—Dutch summary.
- WARNER, D. W., AND R. M. MENGEL. 1951. Notes on birds of the Veracruz coastal plain. *Wilson Bull.*, 63 (4): 288-295, 1 photo.—An annotated list of 92 species of Mexican birds, with a brief description of the area.
- WEBSTER, J. DAN. 1950. Altitudinal zonation of birds in southeastern Alaska. *Murrelet*, 31 (2): 23-26.—Lists characteristic vegetation and common summer birds in the principal plant communities of the Canadian, Hudsonian, and Arctic-Alpine zones.
- WEBSTER, J. D. 1951. Additional notes on the helminth parasites of the Bobwhite in Texas. *Journ. Parasit.*, 37 (3): 322-323.
- WELCH, ARTHUR. 1951. Birds becoming "caught" in flocks of other species. *Brit. Birds*, 44 (12): 405.—A nest of Linnets, *Carduelis cannabina*, with three young about three days old was found August 29, 1946. September 2, the parents were feeding irregularly; at 5:45 p. m. they flew off with a flock of migrating Meadow Pipits, *Anthus pratensis*, that alighted near by for a few minutes. The next day the young were lethargic and on September 4 they were dead.—M. M. Nice.
- WHEELER, ROY. 1951. Notes on "anting." *Emu*, 51 (1): 81-82.
- WHITE, C. M. N. 1951. *Anthus pallidiventris* in Angola. *Ibis*, 93 (4): 627.—Near Luanda, and summary of previous records.
- WHITTILL, H. M. 1951. A review of the work of John Gilbert in Western Australia. *Emu*, 51 (1): 17-29, pt. IV.—The first three parts were published in the *Emu*, 41, 1941-42. Major Whittell describes two note books by John Gilbert, one on Australian marsupials and one on Australian birds, contained in the Queensland Museum in Brisbane. Of special interest are Gilbert's accounts of *Atrichornis clamosus* and *Psophodes nigrogularis*.
- WHITTILL, H. M. 1951. *Circus fuliginosus* Diggles, 1875. *Emu*, 51 (1): 29-31.—A brief account is given of the ornithological activities of Sylvester Diggles during

- the 1860's and 70's, and calls attention to the name *Circus fuliginosus* Diggles, published simultaneously in two Queensland newspapers on May 8, 1875.
- WILLIAMS, C. B. 1951. Intra-generic competition as illustrated by Moreau's records of East African bird communities. *Journ. Animal. Ecol.*, 20: 246-253.—Biological competition between closely related species is probably greater than between species not closely related. Closely related species, however, are probably more suited to similar physical habitats and to similar extra-generic competition. Since statistical analysis shows an excess of congeneric groups with two or more species occurring in the same habitat, above what would be expected by selection without reference to generic relations, it appears that the advantages from close relationships are greater than the drawbacks.
- WILLIAMS, J. G. 1951. Notes on *Anhreptes reichenowi yokanae*. *Bull. Brit. Orn. Club*, 71 (7): 48-50.—A recognizable race inhabiting the coastal forests of Kenya and northeastern Tanganyika; there is an account of plumages and habits.
- WILLIAMS, JOHN G. 1951. *Nectarinia johnstoni*: a revision of the species, together with data on plumages, moults and habits. *Ibis*, 93 (4): 579-595, 1 pl.—*Nectarinia johnstoni* is a species of sunbird confined to the high mountains of eastern Africa from Mt. Kenya to the highlands of Nyasaland; three races are recognized. *N. j. johnstoni* (of which *N. j. idius* Mearns is considered a synonym), *N. j. salvadorii* and *N. j. dartmouthi*; characters and distribution of the races are given. There are descriptions of the juvenal, immature, and adult male eclipse plumages of the typical race; no material representing these plumages is available for *salvadorii*, but it is believed probable that this race has eclipse plumage; after examination of a considerable series of *dartmouthi* it is assumed that this race does not acquire an eclipse plumage. Food is entirely of insects, chiefly Diptera. Data are given on breeding season, nesting sites, and description of nest and eggs.—J. L. Peters.
- WILLIAMS, LAIDLAW. 1952. Breeding behavior of the Brewer Blackbird. *Condor*, 54 (1): 3-47.—Observations made on a nesting colony at the mouth of the Carmel River, Monterey County, California, for six breeding seasons (1942-47). Color bands were used extensively. Behavior is discussed for the phases of pair formation; nest-building, copulation, and egg-laying; incubation; nestling care; and fledgling care. Thirteen call notes were distinguished and seven distinct displays were manifest. Pair formation started while birds were still in flocks. Polygyny was common. Aggressive action of male was only partially associated with a limited area. Incubation was performed by female alone.—W. H. Behle.
- WILLIAMSON, KENNETH. 1951. The wrens of Fair Isle. *Ibis*, 93 (4): 599-602.—*Troglodytes troglodytes fridariensis* (Fair Isle, North Britain) new subspecies.
- WINTERBOTTOM, I. M. 1951. Common birds of the bush. (Longmans Green & Co., Capetown), vii + 40 pp. Price, 5s.—A guide to the identification of 30 common birds of the bush from Northern Transvaal and Natal to Central Tanganyika. There are brief notes on the natural history of each species. Four colored plates show 20 forms and text-figures depict others.
- YAPP, W. B. 1951. The population of Rooks (*Corvus frugilegus*) in West Gloucestershire. II. *Journ. Animal. Ecol.*, 20: 169-172.—Fluctuations in numbers between 1934-39 and 1944 correlate with the area of arable land and with the temperature in March of the preceding year. A rookery is not a stable unit.
- YOCOM, CHARLES F. 1949. A survey of waterfowl in eastern Washington in 1947. *Murrelet*, 30 (3): 46-52, 1 map, 3 tables.—Comparative abundance of each species is tabulated, based on a 2,500-mile survey of 6,726 ducks (plus 2,644 unidentified), 340 Canada Geese and 2,484 Coots. Data are segregated under five regions, and

- brood sizes (667 broods) for three areas (plus 1946 figures for one of them) are also tabulated by species. Mallards constituted 51.7% of the duck population, and 94.7% of this species [from unstated number examined] contained internal parasites. Tapeworms (*Cestoda*) were present in 62.9% of the 62 waterfowl examined.  
—C. S. Robbins.
- YOCOM, CHARLES F. 1950. Red-breasted Merganser in eastern Washington. *Murrelet*, 31 (1): 13.—Three males seen; only recent Washington record east of the Cascades.
- YOUNG, HOWARD. 1951. Territorial behavior in the Eastern Robin [*Turdus migratorius*]. *Proc. Linn. Soc. New York*, Nos. 58-62: 1-37, 14 figs.—A detailed analytical study shows that territoriality in this species is a variable thing—the pattern, when present, varies from the concise, too-definite criteria of Howard, and no line can be drawn between territorial and non-territorial birds. Territoriality is so much a part of the entire complex of behavior that it should not be studied by itself.
- ZIMMERMAN, D. A., AND G. B. HARRY. 1951. Summer birds of Autlan, Jalisco. *Wilson Bull.*, 63 (4): 302-314, 3 photos.—An annotated list of 121 species of Mexican birds, with a brief description of the area.

---

#### OBITUARIES

WILLIAM PROCTER, a Life Associate of the American Ornithologists' Union, elected in 1928, died at West Palm Beach, Florida, April 19, 1951. He was born in Cincinnati, Ohio, September 8, 1872. After graduating from Phillips Exeter Academy (1891) and Yale University (1894) he traveled extensively in the Far East. He was a graduate student at the Sorbonne, Paris, in 1896-97. His academic training was for business, and he was active in this field for 20 years, first in railroad securities, then with the Procter and Gamble Company which his grandfather founded in 1837.

Doctor Procter is a good example of a man with business acumen who eventually found an absorbing interest in science. In 1916 he went to Columbia University and took work in zoology until 1920. Most of his summers had been spent on Mount Desert Island, Maine, and in 1921, with others, he established a research station to investigate the marine fauna. Due to differences of opinion, Procter subsequently founded an independent laboratory at Frenchman's Bay, of which he was president and director up to the time of his death. He concentrated on a study of the insects of the island, the results being published as the 'Biological Survey of the Mount Desert Region,' in seven volumes and parts, covering both the marine fauna and insects. It is doubtful if any area has ever been worked more intensively. He recorded 5,465 forms of Hexapoda and Arachnida and 6,578 insects. Impressed by his work, the University of Montreal in 1936 granted him the degree of Doctor of Science after the customary examinations.

Procter served on the advisory board of the Zoology Department of Columbia University, the managerial board of the Wistar Institute, and as a trustee of the American Museum of Natural History. As editor of the "Annals" of the Entomological Society of America he made substantial contributions of money and of time.

It was not until 1910 that he married the talented Miss Emily Bodenstein, the union being broken by her death in 1949.

No special interest in birds was shown by Procter, but he attained an eminent position in the allied field of entomology.—A. W. SCHORGER.

CHARLES THEODORE RAMSDEN, a Corresponding Fellow of the American Ornithologists' Union, died at Santiago, Cuba, August 24, 1951, at the age of 75. He was born at Santiago, February 11, 1876, and spent almost his entire life in the place of his birth. He received the degree of Ph.B. from Yale University in 1896 and the degree of Sc.D. from the University of Cuba in 1918. He was elected an Associate of the A.O.U. in 1912 and was made a Corresponding Fellow in 1918. After his election he published a number of brief notes in 'The Auk,' chiefly on the distribution and occurrence of rare birds in Cuba.

Dr. Ramsden was an all-round naturalist, interested not only in the vertebrates and insects of Cuba, but also in the mollusca of the island, a field in which he was a well-known authority.—T. S. PALMER.

WALTER E. ROGERS, elected an Associate of the American Ornithologists' Union in 1935, died in Appleton, Wisconsin, October 5, 1951. He was born in Greenview, Illinois, February 24, 1890. His interest in nature was aroused when, as a boy, he attended the Old Salem Chautauqua meetings with his family. Eventually he specialized in botany. He graduated from James Millikin University in 1913, and this institution granted him the degree of Doctor of Science in 1939. Other institutions which he attended were the University of Michigan, Ohio State University, Cornell University, and the University of Iowa.

He was microscopic technician at the Saint Louis Biology Laboratory (1913-14), assistant in plant morphology at the University of Iowa (1914-17), and professor of biology at Westminster College, New Wilmington, Pennsylvania (1917-19). Becoming professor of biology at Lawrence College in 1919, he served for a period of 32 years. A course in ornithology was taught for many years, his wife assisting him in the field work. An intention to work on the genetics of birds, and other avian problems, after retirement could not be fulfilled.

Mr. Rogers was a member of the Torrey Botanical Club, Botanical Society of America, Iowa Academy of Science, Wisconsin Academy of Sciences, and Wisconsin Society for Ornithology. His 'Tree flowers of forest, park, and street' (1935) is noted for the artistic beauty of the illustrations.

Those who knew Professor Rogers were impressed by his devotion to his family and to his students. He is survived by his wife, four daughters, and two sons.—A. W. SCHORGER.

ORPHEUS MOYER SCHANTZ, an Associate of the American Ornithologists' Union, elected in 1919, died in Red Bank, New Jersey, September 2, 1951. He was born in Port Elgin, Ontario, May 27, 1864. Coming to the United States in 1881, he resided in the Chicago area from 1890 to 1942, and at Red Bank from 1942 until his death. He was President of the Illinois Audubon Society from 1914-1930. In addition to becoming a life member of the Chicago Academy of Sciences in 1910, and an honorary life member in 1944, he served on the Board of Scientific Governors of the Academy from 1926-1940. He also served as director and treasurer of the Geographic Society of Chicago and as Chairman of the Excursions Committee that conducted tours to the Great Smoky Mountains.

Mr. Schantz was author of the following papers: 'Birds of Illinois' (Ill. Dept. Cons. Publ. No. 6, 1928); 'Indiana's unrivaled sand-dunes—a natural park opportunity' (Nat. Geog. Mag., 35:430, 1919); 'Beyond the haze in the high Smokies' (Country Life, 50:60, Aug., 1926); 'Albino gray squirrels' (Nature Mag., 14:111, 1929); and 'Taking a garden tip' (Nature Mag., 19:116, 1932).

During the latter years of his life he was an instructor at the Freehold (N. J.) Military Academy and naturalist at Camp Echo Hill, Clinton, N. J. He and his

associates were instrumental in establishing a National Park in the Great Smokies. His contributions to conservation and the preservation of unusual natural areas will be long-lasting.—A. W. SCHORGER.

ROLLIN BURDETTE TROUSLOT of Walnut Creek, California, an Associate of the American Ornithologists' Union, elected in 1933, died in April, 1939, in his 78th year. He was born in Sandwich, Illinois, May 28, 1861. He was known personally by the late Harry S. Swarth who had visited him at his home.

Trousot is one of the mysteries among California ornithologists. He must have been interested in birds or he would not have been elected an Associate of the A.O.U. He lived in an interesting region at the foot of Mount Diablo, not far distant from Berkeley and San Francisco, both centers of ornithological activity, yet he published nothing and apparently was almost unknown to most of the local bird men.—T. S. PALMER.

ARTHUR BALDWIN WILLIAMS was elected an Associate of the A.O.U. in 1938 and a Member in 1950. He was born at Montclair, New Jersey, on April 11, 1874, and died at his home in Cleveland Heights August 18, 1951.

He was graduated with honors from Yale University in 1898, where he was elected to Sigma Xi for his outstanding contributions in natural history. In 1932 he received his M.A. from Western Reserve University in Cleveland, and in 1935 his Ph.D. from the same institution.

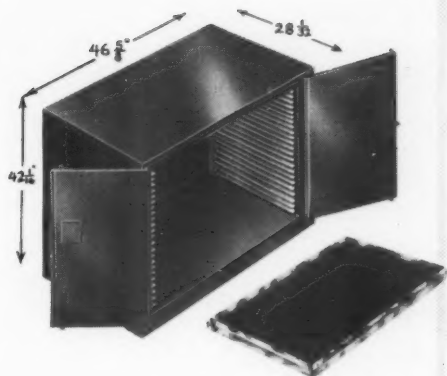
As a result of his efforts in teaching natural science to children at the Fairmount Presbyterian Church in Cleveland Heights, he was made the first Park Naturalist for the Cleveland Metropolitan Park Board. He joined the staff of the Cleveland Museum of Natural History in 1930. In 1939 he was made Curator of Education at the Museum, the position he held until his retirement in June of 1950.

He originated the Kirtland Bird Club in 1940, the first of the Museum's amateur scientific societies, and edited the 'Cleveland Bird Calendar,' beginning with the second number of 1941. In 1950 he completed a compilation of bird records for the Cleveland region and edited 'Birds of the Cleveland Region,' published by the Museum.

During his work in the parks and at the Museum, his major interest was in the study of birds. He conducted, continuously for 18 years, a nesting census of a 65-acre tract in the North Chagrin Metropolitan Park. A summary of this study was published in 'Audubon Field Notes' in 1947. Dr. Williams was particularly interested in the ecology and life history studies of birds, and worked intensively on the nesting habits and distribution of the Hooded Warbler. From March, 1944, until the week of his death, he wrote a weekly nature column for the 'Cleveland Press.'

Dr. Williams, as we all knew him, was a real teacher. His inspiration came from the out-of-doors, and he had the ability to pass on his enthusiasm to others. His work will go on in the Cleveland region in the form of the "Bird Calendar"; the spring bird walks sponsored by the Museum, which grew to 13 simultaneous Sunday morning walks in 1951, drawing an attendance of nearly 500 people; the Kirtland Bird Club; the Trailside Museums in the Cleveland Metropolitan Parks; and the outdoor education program of the Cleveland Museum of Natural History.—HAROLD E. WALLIN.

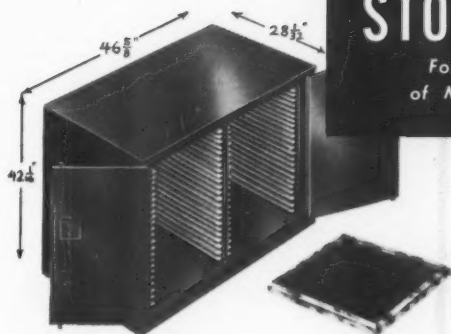




Skin Case #201 for Large Trays

**SKIN CASES  
FOR  
MAXIMUM  
PROTECTION  
CONVENIENCE  
ECONOMY!**

*Lane*



Skin Case #202 for Small Trays

ZOOLOGICAL AND ORNITHOLOGICAL

## SPECIMEN STORAGE CASE

For Protective Storage  
of Mammal & Bird Skins

- Locked "Live Rubber" Seal
- Sturdy double panel doors
- Locking mechanism secures both doors
- Tray guides permit maximum position of tray positions
- Fumigant Compartment
- Specimen Trays of aluminum and masonite — light weight — easy to handle.

FOR ILLUSTRATED BROCHURE WRITE

Institutional Division

CHAS. J.

*Lane* CORP.

46 West Broadway, New York 7, N. Y.

**CHARLES E. MOHR** is director of the Audubon Nature Center at Greenwich, Connecticut, where sessions are held each summer for adults interested in nature and conservation. A leading educator in the nature field, he is past president of the American Nature Study Society and president of the National Speleological Society. His articles and wildlife photographs have appeared in a number of national magazines.



## "New Worlds for the Bird Watcher"

**Writes CHARLES E. MOHR:** "To look at the moon with the naked eye and then through a telescope is to discover the same sort of new world that a bird watcher finds when he starts using a topnotch binocular."

*Charles E. Mohr*

**WRITE FOR FREE CATALOG.** 32 pages of useful information you should know before you buy any binocular. Tells how to select a glass for your own use. Bausch & Lomb Optical Co., 12207 Lomb Park, Rochester 2, N. Y.



Bausch & Lomb  
Zephyr-Light  
Balcoated Optics  
7x, 35mm Binocular  
\$155, plus tax



# THE AUK

A Quarterly Journal of Ornithology

ORGAN OF THE AMERICAN ORNITHOLOGISTS' UNION

For publication in 'The Auk,' articles or notes must present material that has not been published elsewhere and that is of significance to ornithologists. All manuscripts should be typewritten, double spaced, with wide margins. Titles should be brief. Terminal bibliographies are used as a rule for long articles. Where fewer than five references to literature are made, they may be inserted in parentheses in the text. References in manuscript for 'General Notes' must always be in the text. Consult issues of 'The Auk' since January, 1949, for style of citation. Long articles should be summarized briefly. Footnotes, Roman numerals, and ruled tables are to be avoided. Acknowledgments belong in the text. Line drawings must be in India ink on white paper or drawing board; usually these should be planned for at least one-half reduction when printed. Thus, details and lettering must be correspondingly large. Captions must be brief. Photographs must be hard, glossy prints of good contrast. Common and scientific names of North American birds should follow the A.O.U. Check-List except in taxonomic papers giving formal, critical discussions.

Proofs of all articles and notes will be sent to authors. Reprints from articles, 'General Notes,' and 'Correspondence' are to be paid for by the author. These must be ordered from the Editor on the blanks sent with the proof and must be returned with the proof. Printed covers can be furnished at additional cost.

All articles and notes submitted for publication and all books and publications intended for review should be sent to the Editor,

HARVEY I. FISHER  
*Department of Zoology  
University of Illinois  
Urbana, Illinois*

Send changes of address, claims for undelivered or defective copies of 'The Auk,' and requests for information relative to advertising, subscriptions, back numbers of 'The Auk,' as well as for other publications of the A.O.U., to the Treasurer,

R. ALLYN MOSER  
*90th and Farnam  
Omaha 6, Nebraska*

---

## OFFICERS OF THE AMERICAN ORNITHOLOGISTS' UNION

*President:* JOSSELYN VAN TYNE, University of Michigan Museum of Zoology, Ann Arbor, Michigan.

*Vice-Presidents:* ALDEN H. MILLER, University of California Museum of Vertebrate Zoology, Berkeley 4, California.

LUDLOW GRISCOM, Museum of Comparative Zoology, Cambridge 38, Mass.

*Secretary:* ALBERT WOLFSON, Northwestern University, Evanston, Illinois.

*Treasurer:* R. ALLYN MOSER, 90th and Farnam, Omaha 6, Nebraska.

**RICHARD H. POUGH**  
*Author and Conservationist*

## *Says*

As a conservationist I feel that *Audubon Field Notes* is important to all who are interested in the welfare of birds. Are your local birds maintaining their numbers from year to year? Do changes in abundance that you may have noted locally portend a definite trend? Only through *Audubon Field Notes* is sufficient data available for you to evaluate your findings by comparison with observations elsewhere.

In this era of increasing use of deadly poisons and more widespread disturbance of bird habitats we must continue to have a way of detecting unfavorable trends as quickly as possible. *Audubon Field Notes* needs your support both as a subscriber and a contributor. \$2 spent on a subscription is \$2 well spent for conservation.

Sincerely yours,  
RICHARD H. POUGH

\$2.00 for one year (6 issues per year)  
\$3.75 for two years \$5.50 for three years

Send your order to

**NATIONAL AUDUBON SOCIETY, 1000 Fifth Avenue,  
New York 28, N. Y.**

## **BINOCULARS FOR BIRDING**

**Should always be  
Adjusted to U. S. Government Specifications**

**ALL BINOCULARS WE SELL** are shock tested, and checked on our precision collimator, to make sure they meet these rigid requirements. Our new and reconditioned glasses include the finest American and German makes, and a full line of the best Japanese (including a coated 6x30 for only \$39.50). Liberal trade-ins. We ship on 20 days' trial with refund guarantee; send for our free list.



**ALL BINOCULARS WE REPAIR** are adjusted to the same specifications. We repair and coat all types and makes. Send your glass for free estimate, and our free leaflet "These Hard-Coating Jobs." We also check glasses without charge and answer questions personally.

**For how to use, choose and check a binocular read  
Our articles published in Audubon Magazine  
"Know Your Binoculars"**

*Reprint priced 10c, no charge to A.O.U. members.*

**MIRAKEL REPAIR CO.**  
*Binocular Specialists Since 1923*  
**Mount Vernon 10, N. Y.**

## **We Have a Book Catalog for You**

Catalogs issued semi-annually—books on birds, mammals and other natural history subjects; current, out-of-print titles, and serials. Catalog sent on request.

We buy natural history books. Generous prices, prompt payment. We are interested in buying single volumes or complete collections of books.

**PIERCE BOOK COMPANY**  
*Dealers in Natural History Books*  
**Winthrop, Iowa**